RAILROAD GAZETTE

FRIDAY, JULY 11.

CONTENTS.

ILLUSTRATIONS: PAGE.

Comparative Tests of Locomotive and Electric Motor..... 489
Proposed Bridges and Belt Roads at New Orleans..... 490
Chilled Wheels by the Detroit Car Wheel Co..... 490
Car Wheel Foundry Plant—Detroit Foundry Equipment Co..... 491
Sketch of the Wheeling Bridge and Terminal System..... 492
O'Neil's Highway Crossing Signal..... 492

CONTRIBUTIONS:

Temperature of Smoke Box Cases..... 487
An Appeal from Mr. Coffin.... 487

EDITORIALS:

Efficiency of the Locomotive and the Electric Motor..... 494
The Time Interval between Trains..... 495
Freight Rates in Prussia for the Last Ten Years..... 496

EDITORIAL NOTES.... ....494, 496

NEW PUBLICATIONS... 496

GENERAL NEWS: PAGE.

Technical..... 497
Railroad Law..... 498
The Scrap Heap..... 497
Locomotive Building..... 498
Car Building..... 498
Bridge Building..... 498
Meetings and Announcements. 499
Personal..... 499
Elections and Appointments.. 499
Railroad Construction..... 500
General Railroad News 502
Traffic..... 502

MISCELLANEOUS:

Electric Lighting in Railroad Service..... 487
Comparative Tests of an Electric Motor and a Steam Locomotive on the Manhattan (Elevated) Ry..... 488
Cause of the Constantly Decreasing Mileage of Freight Cars on Home Roads..... 492
Mr. Walker on the "Food Products" Case..... 493
Some Prussian Locomotives... 493
Automatic Freight Car Couplers Before the Mass. Board of Railroad Commissioners.. 493

Contributions.

Temperature of Smoke Box Cases.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There is a very interesting article in your number of July 4 on experiments with tubes of varying lengths made on the Paris, Lyons & Mediterranean Railway. That part of it referring to temperature in the smoke box as being governed largely by the strength of draft, corresponds exactly with what was always shown in the series of tests made by me; that is, the stronger the draft the higher the temperature in the smoke box (up to the limit, of course). The highest I obtained was a little over 900 degrees, but only for short intervals, not over one minute at a time in most cases. Opening the fire door for, say, three shovelsful of coal always reduced the temperature about 100 degrees below what it was when the door was first opened, but on closing the door it rose again as rapidly as it had gone down, and in most cases considerably above that for a short time, when it gradually went down as holes were burned in the coal through which a surplus of air was drawn into the fire box by the draft.

The highest temperature in the smoke box and most likely in the fire box also was always about 30 seconds after putting in fresh coal, *and while considerable black smoke was escaping from the smoke stack.* As soon as the smoke became less, the temperature in the smoke box also became less and when no black smoke came from the stack the temperature was always falling, showing that in order to "*burn the smoke*," as it is termed, a surplus of air is required which seems to rob the fire box of a portion of its heat, etc.

My object in making these tests was mainly to determine whether in the locomotive as it must be operated in doing its work, using coal such as we generally find it, there was an actual waste of fuel in the form of black smoke or not. I conclude that while there is a slight waste of fuel that is thrown out of the stack in the form of smoke, (small particles of coal and unburned gases), the amount of air necessary to consume them in the fire box so far as that can be done is in excess of that required to generate the highest temperature there, and that this excess of air is as wasteful so far as making steam is concerned as the former evil and may readily be more so, depending on the volume of the surplus air that is drawn in.

The tests referred to were made with engines with the plain fire box (without brick arch or water table). A brick arch or some form of "water table" in a fire box is not only economical, but it lessens very materially the smoke nuisance and the quantity of cinders and unburned fuel that otherwise would be thrown out of the stack.

R. WELLS.

An Appeal from Mr. Coffin.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I must ask you once more to allow me to appeal to the managers and owners of railroads in this nation in behalf of their employés. I have before me the report of the conference of State Railroad Commissioners with the Interstate Commerce Commission here in Washington, held May 28 and 29 this year. In that report is a synopsis of railroad accidents for the year ending June 30, 1890. I will quote here only the list that is directly traceable to coupling cars and using the old hand brake:

"Coupling and uncoupling cars, 300 killed and 6,757 injured.

"Falling from trains and engines, 493 killed, 2,011 injured.

"Overhead obstructions, 65 killed and 296 injured."

Making the terrible total, 858 killed and 9,064 injured —a total for one year, 9,922.

Falling from engines does not always come from poor coupling, and what number must be deducted from the total so as rightly to get at the number due to couplers and brakes, I cannot say, but it is perfectly safe to offset these with those who are killed and injured in collisions and other accidents which could have been prevented if all trains were equipped with power brakes.

Here are, then, 9,922 of these employés who have thus been killed or crippled, and in most cases for life, this last year, as shown by the reports of the railroads themselves to the Interstate Commission. How many of these poor fellows who were reported "injured" have since died from those injuries, God only knows.

Still, with these terrible facts confronting us, some of the high railroad officials come here and oppose the enactment of a broad liberal law requiring the railroads to equip their cars in a reasonable time with safety appliances, which they admit are now at hand and perfectly practical, just because, to use their own words, "it would be a bad precedent to establish" for Congress to commense legislating to save these 10,000 men who are ground to death under the wheels or otherwise injured yearly.

Gentlemen, every trainman on your roads know that now there is no excuse for longer delay. They know, and know it, too, perhaps better than you do that there are good, practical automatic couplers, and they know that freight trains can be controlled by power brakes by the engineer, and can you blame these men if they soon conclude they will no longer take such risks as they now run in coupling and breaking with these old death dealing appliances?

I am well aware that some of the more progressive roads are equipping their cars with these safety couplers and brakes, but we all know there are tens of thousands of cars in this country that would not and will not be so equipped in the next decade unless there is a "thus saith the law." This proposed law will not injure any of these go-ahead roads. Why then should they oppose it? Foreign cars will and must come to your road; let the law say such cars must be safe for your men to handle; show that you think more of thelives of your faithful men than of a mere sentiment that says, "let us alone."

L. S. COFFIN.

Electric Lighting in Railroad Service.

Extracts from a paper read at the ninth annual meeting of the Association of Railway Telegraph Superintendents, Niagara Falls, N. Y., June 19, 1890, by M. B. Leonard, Superintendent of Telegraph, Chesapeake & Ohio Railway.

Our important trains are now lighted by electricity. In Europe the arc light has been extensively adopted for stations, and in one station alone, that of the Great Western of England, in London (Paddington), not less than 100 arc lamps are used. The French, German and Italian railroads are gradually lighting up the larger stations and yards in this way.

For many years one of the most prolific sources of injury to railroad men and loss to the company has been the switching of cars in the yards at night, with only a hand lantern to indicate the movements required. The engineer, owing to the darkness, is obliged frequently to depend mostly on luck to guide him in handling his engine, the result being often a crushed hand or shoulder for the brakeman. Even if no personal injury be done, the engineer miscalculating his distance in the darkness comes back too hard and breaks drawheads or crushes the ends of cars. The introduction of arc lights in large yards has worked a wonderful improvement in this direction, and its use for this purpose is now general from the Atlantic to the Pacific. Extended inquiry shows that these lights pay for themselves several times over in the single item of repairs saved to rolling stock by enabling the engineers to do the switching more carefully.

By the use of arc lamps a greater amount of loading or unloading can be done at night than with oil lamps, and there is a reduction of the number of car robberies and shortages. At the Chesapeake & Ohio terminus, at Newport News, Va., large quantities of freight are transferred from boats to cars at night. Under the old oil lamp system it was found impossible to get the freight billed and cars loaded and started within less than 12 to 14 hours after the steamer's arrival. Claims for shortage and damage, and reports of freight astray were numerous. A 50-light plant was put up; immediately a new order of things prevailed. Freight was billed and loaded correctly, and there being no dark corners, the shortages and damage claims began at once to diminish. The trains were ready in about one-half the time formerly required, while a substantial rebate was made by the insurance companies from the premium previously paid, which served to offset the cost of the electric plant materially.

The lighting was extended to the immense coal piers of the company, and the coaling of steamships, which up to that time was done very slowly, and only at great hazard during the night, was rendered almost as easy as in daylight. The Pennsylvania uses 80 arc lights on its coal wharves, yards, engine houses and depots in the city of Philadelphia.

Mr. Leonard then referred to the experiments printed in the *Railroad Gazette* of March 14 last, and continued:

In this country the best results seem to be obtained from the 10-ampère long arc, or from 40 to 50 volt lamps set on poles 35 ft. high, and from 400 to 600 ft. apart. The clear glass globes give the best illumination, as but few of the light rays are absorbed by the glass, but the unshaded glare of the light is very trying to the eyes of the trainmen, and so the half ground globes are preferred.

An important improvement has recently been made in arc lamps which results in an enormous increase in the luminosity of the arc. It is effected by making the lower carbon hollow and fitting it with a reservoir of oil and a wick. The oil, ascending the wick by capillary attraction, is converted into carbon vapor by the heat of the electric arc, reinforcing the light of the arc by luminous particles of incandescent carbon, thereby increasing its brilliancy. Tests of this lamp recently made by Dr. Hopkinson, of London, show that the efficiency of the arc in watts per candle is nearly doubled, the color of the light being changed to a clear yellowish white, while the increased cost of the hollow carbon and the oil is so small that it is not worth mentioning. A single drop of the oil lasts nearly a minute. It is claimed that the cost of arc lighting is reduced so that it is equal to gas at 10 cents per 1,000 ft. Very little or no alteration is required to utilize this improvement in the present styles of arc lamps, and it is confidently expected that its adoption will soon become universal.

The Electric Light in Switch Stands.—Mr. Leonard then referred to the plant of the Southern Pacific at Oakland, Cal., described in the *Railroad Gazette* of July 6, 1888, and continued: So satisfactory were the results, that the number of signals lighted has been increased gradually until 134 lamps in the interlocking and automatic signals, switch stands, switch lights and signal towers are now lighted by electricity. Thirty-one of these lamps are in switches and signals, the wires conveying the current being run underground, 16 of them light up four signal towers, while the balance are in signals located on posts and connected by over-head wires, all being supplied by one dynamo. The signal lamps are 33 volts, and are wired from 10 to 15 in multiple according to the number of signals within convenient distance to form a group, thus reducing the E. M. F., so that the lamps use only from 30 to 28 volts pressure, thus lengthening their life and yet giving a sufficient amount of light to illuminate the bull's-eye. In putting up the lamps for the signals, the lamp with its socket is screwed on to a rubber nipple placed in the centre of a wooden base, made the same size as the oil lamp bottom which it displaces. Wires passing down through the rubber nipple and in grooves cut in under side of the base, connect the lamp with binding posts on the corner of the base, which makes a complete and portable device for placing in almost any style of lantern. For the signals on posts a tin box or case was designed 7 in. × 6 in. × 3 in., with lens on one or both sides and with wooden bottom made to hinge or screw at one end and fastened by a thumb screw at the other end, secured to the post by a pocket constructed on the narrow side of the case and an iron bracket on the post in the usual manner. This box is made from one sheet of tin and is soldered tightly together with no openings except a bottom, which is closed by the wooden lamp base. If well painted, white inside and green outside, this lamp case will last indefinitely. After being placed in position and connecting the wires, no further care or attention is required beyond occasionally cleaning off the outside of the lens. The lamp complete, including case, base, lens, socket and lamp, costs about $2 each, as compared with about $5 each for an oil lamp which lasts only two years. The lamps first installed over three years ago are still in use and have required no other care or attention than renewing the underground wire to two of them. The additional amount of power required for the signal lamps is only about 5 h. p. This seems to be the only plant thus far installed on so large a scale, and the results obtained evidence a large economy. * * * The Central of New Jersey has 45 interlocking signal lamps at Jersey City, which consume five gallons of oil daily, at ten cents per gallon, or $15.50 per month; there are two lamp men at $40 and $45 per month, and the total expense for the 45 lamps is $100.50 per month, as against $90 for the 134 lamps of the Southern Pacific at Oakland (where the signals bear too large a share of the total expense), without considering the cost of breakage and the trouble from lamps exploding, which is likely to occur at Jersey City.

Lighting Passenger Trains.— . . . The Intercolonial, of Canada, has adopted the accumulator system alone, on the trains between Halifax and Quebec, and now has more than 40 cars fitted up with electric lamps, which are of 16 c. p., and vary from 11 to 22 to a car. The accumulators are charged at four different points on the line. The trains run about 500 miles with one charge, and the results thus far obtained are very satisfactory; but to provide for emergencies, oil lamps have been retained in each car.

The combination of dynamo and storage battery, first adopted by the Pullman Company, is gradually being extended in this country, and is giving great satisfaction, but it appears at a large expense for maintenance. The Chesapeake & Ohio vestibule train, the "Fast Flying Virginian" running between New York and Cincinnati with six cars is supplied with 118 lamps divided thus: two Pullman cars, 30 lamps each; dining car, 26; day coach, 16; combination car, 13; and the baggage car, 2. Up to May 1, 1890, the average cost per lamp for maintenance and renewals was $1.10 per month. Yet where the exhaust steam is utilized for heating the train, the cost can be materially decreased.

Mr. Houghton, Telegraph Superintendent of the London, Brighton & South Coast, one of the patentees of the system of taking power from the car axle (described in the *Railroad Gazette* Jan. 3, 1890), advises me that there are 16 trains running on that road which are so lighted, 13 of them local trains and three express. The speed of the express trains reaches 70 miles an hour, while that of the locals is from 20 to 60 miles per hour.

The express trains are wired for an average of 70 lamps and the others 40. The candle power of these lamps varies from 8 to 16, according to the speed of the train. The dynamos on these trains have a maximum capacity of 5,000 watts, varying with the speed of the train, which at 10 miles per hour gives about 48 volts and 35 ampères, and at 60 miles 65 volts and 75 ampères. The brushes are mounted in pairs on a rocking frame, so arranged that either set of brushes can be brought in contact with the commutator as required by the direction of the train. In each lamp circuit a regulator is placed in order to keep the light in the lamps at the same power regardless of the speed of the train, and shunt any surplus current into the accumulators; so that 42 volts may be used with a dynamo of any E. M. F. above that voltage without any variation in the light of the lamps.

The trains on which this system is used consist mostly of 10 cars which run solid, that is, are not broken up, and average forty 12 c. p. lamps to a train. By using accumulators in each car, however, no difficulty would be found in splitting up. The total weight of the plant on each train is three tons; the cost of plant is £400, and the cost of maintenance per annum is £65. The only attention given the trains is at each terminus where one man inspects the apparatus and oils the pulley bearings. One of these trains has been running since Dec. 19, 1883, without a single failure being reported. During the first 11 months of its use it made 2,352 trips and ran 27,322 miles.

The Midland, of England, is running three trains lighted by electricity and has recently fitted up two others. Two of these are short trip trains, always run solid, and the others main line trains made up at various points. The dynamo is placed in the baggage car and is also driven from the car with about the same electrical arrangements as are used on the Brighton road. The short trains have 85 lamps run from one set of stor-

age batteries in the baggage car. On one train the batteries are in series, but on the others in parallel. The latter seems to be the most satisfactory. This system of illuminating passenger trains is becoming very popular in England. The expense, as shown by seven years' experience on the Brighton road, is certainly not greater than where oil is used and seems to corroborate the report made by M. M. Sartiaux and Weissenbruch to the International Congress at Paris a year or two ago. in which it was stated that for lights of the same candle power gas supplied by the Pintsch system would cost about 11.3 centimes and Colza oil about 16.9 centimes per lamp hour as against 3.6 centimes for the electric light.

Mr. Leonard also described the electric headlight (*Railroad Gazette*, Jan. 17, 1890) and the Chicago, Milwaukee & St. Paul lighting car, illustrated in the *Railroad Gazette* of June 13, 1890. Reference was also made to the experiments of Mr. Barrett on the Connecticut River road.

Comparative Tests of an Electric Motor and a Steam Locomotive on the Manhattan (Elevated) Railway New York.

What follows is an abstract of a paper presented by Mr. Lincoln Moss at the Cresson convention of the American Society of Civil Engineers. The accompany diagrams are reproduced from those prepared by him and submitted with the paper.

Mr. Moss in February, 1889, was detailed from the Chief Engineer's Department by the General Manager, Colonel F. K. Hain, to conduct tests to determine the efficiency of an experimental "direct" electric system of motive power, as compared with the present steam locomotive performance. The system was one of three which had been tried at various times on the elevated roads, and the only one which had been pushed far enough to be recognized as a possible competitor of the steam locomotive, and much credit is due to the inventor's skill and persistence.

The section of road chosen for the experiment was 1.76 miles long, from Twelfth to Fifty-first street on the Ninth Avenue line. A profile of this section is shown, giving the grades, stations and streets. The trial trains were made up of empty cars of the new standard type, which weigh 29,500 lbs. each, empty; at first two were pulled, then three, and finally four; these four empty cars weighed a trifle less than the four-car trains, loaded, which are run on this line in regular service. The trial cars have each two four-wheeled trucks of the swing bolster pattern, with four wheels, 30 in. diameter, which are of the steel-tired Allen paper variety.

After the experiments with the electric system were concluded, a steam locomotive was detailed from regular service to pull the same train over the same section and under the same conditions, as far as possible, to determine the relative efficiency.

Description of the Electric Plant.—The generating machinery was located at the south end of the section in a side street, and about 400 ft. west of the railroad structure. The boilers were of the ordinary horizontal tubular pattern, set in brickwork, on the return system, rated at 100 H. P. each, and furnished steam at a pressure of 80 to 90 pounds per square inch; two boilers were used in the lighter runs, and three subsequently.

The engine was a horizontal "Wright's automatic cut-off," with a single cylinder, 22 in. bore by 42 in. stroke, and worked non-condensing; the 11-in. crankshaft carried a fly-wheel 16 ft. diameter, 2 ft. face and 1½ in. rim, which revolved, in the later experiments, from 90 to 100 times per minute, depending on the resistance, giving a piston speed of 630 to 700 ft. per minute, and a velocity of belt, which ran from the face of the fly-wheel to the main shaft pulley, of 4,524 to 5,026 ft. per minute. This engine was in charge of experts, and was fined down to practically perfect adjustment, showing but five per cent. friction. The greatest indicated horse power found during the trials was 400.

There were four generating dynamos, nominally 50 horse power each; they could be worked in parallel or in series by means of a switch, and were driven by belts and wooden pulleys from the main line shaft. There was a small four horse power dynamo in addition, which supplied current for the engine room incandescent lights.

The current was conveyed from the dynamos to the railroad structure conductors by two insulated copper cables strung on poles; at the structure the cables were divided to connect with the three positive conductors on the east, centre and west tracks. The positive conductors were of very fine copper, ⅝-in. round rods, bolted to the wooden guard timbers by insulated clamps. The negative conductors were made up of the east line rails of each track; they were connected by ordinary angle splice bars and bolts, and also were connected electrically by copper wires at each joint, riveted in the flanges. The positive conductors of the east and west tracks were cross connected at intervals of about 200 ft. The circuit was closed through the motor on the track by a device which had copper leaved brushes which slid over the positive conductors and the current after passing through the motor dynamo and its connections, was returned through the driving wheels into the rails, passing thence back to the generating dynamos. Another copper brush was provided on the opposite side of the motor to bridge gaps in the positive conductors on the switches.

The four driving wheels were 48 in. diameter, 6 ft. between centres, and coupled to obtain the maximum tractive force; on the rear axle were two carefully cut-steel gears, driven by two steel pinions keyed on the shaft of the dynamo; on this shaft were the armature and commutator revolving between the field magnets; the brushes were movable and could be reversed to change the direction of rotation, but not when under headway. The brake shown was electro-magnetic, but was more effective when applied by the hand wheel and screw. The motor could be cut out of the circuit, but this was not done for fear of injury to the mechanism. The exact weight of this motor was unknown; it was known to be 10 tons and probably weighed more. The motor dynamo was said to possess 120 horse power.

Handles were used at first to vary the speed of the motor by raising or lowering the resistance of the field magnet circuit, or the strength of the field, but in the later and heavier experiments additional resistance was introduced. The driving wheels were allowed to play in the pedestals a trifle by means of rubber springs, and the teeth of the pinions consequently moved up and down between the teeth of the gear wheels when vibration took place.

One purpose of returning the current through the driving wheels into the rails was to increase the adhesion or frictional coefficient between the wheels and the rail. While the writer believes this claim has foundation, it could not be proved, as the motor did not possess sufficient power to slip its own wheels against the friction due merely to the actual weight upon the wheels. The maximum pull in a test to determine this, if possible, was 4,500 lbs. for an instant, on a dry track, which is often sanded at that point by the engines hauling express trains. This pull of 4,500 lbs. would give a coefficient of friction for 10 tons concentrated on the drivers of .225, while a coefficient of .35 is not unusual at such a place in locomotive practice. The motor was equipped with sand pipes at each end, which are not shown, nor are the resistances, switches and various wire connections shown.

The train consisted of four empty cars, weighing 29,500 lbs. each, as before described. This train weighed somewhat less than a fairly loaded four-car train, such as is run on this line during the busy hours of the day, and the test was an attempt to imitate the run of such a train, stopping at all the stations on the way.

One of the diagrams shows the indicated horse power of the driving engine, which is the prime mover to be considered, and which propels the train through the medium of the electric current.

The third profile shows the net or effective horse power exerted at the draw-bar of the motor and is the measure of the power used to propel the train; it is also the measure of the fraction of the power developed by the prime mover actually recovered for useful work at the draw-bar of the motor. The average power generated was 176.8 horse power, while the amount recovered on the track was 26.7, making the average efficiency .151 and the average loss 84.9 per cent.

The coupling link between the motor and train was a Shaw hydraulic dynamometer, with a 12-in. gauge, graduated in hundreds of pounds.

The various distances having been carefully measured, the velocity of the train was obtained by dividing the length of a given block by the number of seconds consumed in passing it. for the velocity in feet per second.

The power expended by the prime mover never went back to zero, even when the train and motor were standing at a station, at which time there was a constant average expenditure of 43 H. P. Of this about 2 H. P. is lost in the engine itself, and the rest is consumed in friction, local currents, current waste, resistance and leakage. This shows nearly 24 per cent. of the total average expenditure.

The greatest power of the engine was exerted when the train was being started. For this reason it was claimed at one time that better running time could be made with electric motors than with steam locomotives, which exert the least horse power in starting, although the steam is admitted to the cylinders at nearly full stroke. The fallacy of this belief becomes apparent by referring to the diagrams. The net horse power actually exerted upon the train is least when the train is being started, the dynamometer shows a low initial pull, with a characteristic falling back, and the speed line invariably shows a hollow curve of acceleration in place of the full curve which would indicate a rapid acceleration of speed, and a correspondingly great exertion of power against the resistance of the train. From a consideration of these facts, we may inquire where was the great loss in starting—notably at Thirtieth street station, where the driving engine indicated 395 horse power, while, at the same time, but 7.6 horse power was being exerted to pull the train, showing less than 2 per cent. of the power of the engine transmitted to the train at that instant. The chief losses are due to several facts in the operation of electric motors.

First.—The general economy and efficiency are greatest when a certain ratio of speed exists between the generator and the motor armatures. Usually this ratio is as 2 : 1, the motor armature revolving but half as rapidly as the generator's armature. This is principally due to the necessity of keeping the counter electro-motive force, or the current set up by the motor itself from being driven, at a certain intensity.

Second.—The economy is greatest, other things being equal, when the load is lightest.

Third.—When a motor is being started, there is no counter current, and it is necessary to increase the resistance by rheostats, shunts or resistance coils, or by varying the strength of the field, and these methods increase the current waste in accordance with Joule's law of current waste ($C^2 \times R$ = current waste), "C" being the current in ampères, and "R" being the resistance in ohms.

The action of an electric motor bears some resemblance to that of a steam locomotive. In the latter, in starting, the distribution of the steam is the most wasteful, and the average pressure on the pistons is the greatest when "notched up" so as to expand the steam more economically, the economy is very much improved, and the average pressure falls comparatively low, but although low, it is applied so much more rapidly that a greater horse power is developed. So in an electric locomotive the electrical pressure is greatest when starting because of the "resistance" introduced, and the current used is greatest, owing to the absence of counter-electro-motive force; but as the speed increases and the resistance is cut out and the counter current increases, the electrical pressure becomes less, and also the current used, for it is evident that if the speed of the motor was increased enough the new or counter current generated by the driven motor acting as a generator would equal the current derived from the generating dynamo, and no work would be done by the motor; so that when the motor is working rapidly and the impulses are of low pressure and quantity, the efficiency is the greatest, although it seems like a strange kind of efficiency which depends upon the development of an opposing force.

Of course the heavier the load or the steeper the grade to ascend the greater is the "resistance" required in order to increase the horse power, and as the speed of ascent on a grade is below the normal, the counter current is small and the current waste is greater, as more current is used, so that we might expect to find at Thirtieth street, which is at the foot of the 1.$\frac{55}{100}$ per cent. grade, the greatest waste of power and the least efficiency. On this occasion the rear end of the train was on the down grade. When the current was switched into the dynamo to start the train the resistance was immediately felt at the power station, the dynamos and driving engine slackened their speed about 10 per cent., which allowed the arms and weights of the centrifugal governor to fall and increase the period of admission in the steam engine cylinder. Of course the greater the load the lower would the governor arms drop, so that in starting out from Thirtieth street the initial card shows the steam admitted for the full stroke. On one occasion, at this point, the engine worked so vigorously against the resistance as to burn out the brushes of one dynamo. Of course in handling heavy loads, when much current is wasted, it shows itself in the form of heat. On one occasion, in running with an experimental combination, sufficient heat was liberated to set fire to the insulation and woodwork in the motor.

Some persons claim a restoration of power on the down grades, upon the theory that the armature in the motor, propelled by gravity, will generate a current which will be restored to the line. While this should be so theoretically, provided the armature revolved rapidly enough, it will suffice to state that a careful comparison of the light cards taken while the train was running down the long one per cent. grade from Thirty-fourth to Forty-second street, by gravity, with the cards taken when the train was not in motion at all, and the generating engine was running "light," show no perceptible diminution.

At first, in these experiments a current of low potential was used, but as the loads were increased and the usual stops and starts made with the load, it became necessary to increase the power. This was done by increasing the speed of the engine from 80 to 100 revolutions per minute, the effect of which was to increase the potential by revolving the dynamo armatures faster. While the current used was not deadly, it was strong enough to knock a man off his feet, and as it was exposed not only in the conductors but also in the wheels, side-rods and other mechanism about the motor, in practice, it would have been imperative to use a pressure in the neighborhood of that prescribed by the London Board of Trade, 300 volts.

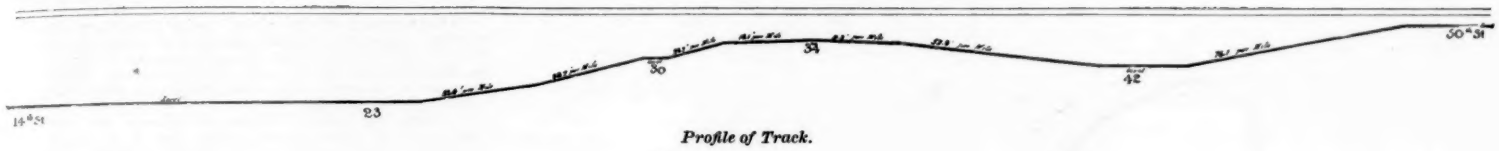
High speed of armature is an important requisite, and as yet no means have been found practical to apply the motor armature to the driving axle direct. Direct action and elimination of gearing and intermediate contrivances is the best for all engines, whether stationary, locomotive or marine, and the electric motor was undoubtedly at a disadvantage in being compelled to use gearing to reduce the speed; especially should we expect quite a loss in friction, because the pitch lines of the gear wheels and pinions were constantly varying as the axles moved up or down in the pedestals. This motor originally was built with *V* friction gearing, which was found to be unreliable and useless owing to the oscillations. The loss due to varying counter current and current waste is, of course, common to all electric motors, from whatever source the current is derived. Some inventions have been made to obviate this great source of waste, by keeping a constant rate of armature speed and using variable intermediate gearing, and other inventions have been made with this purpose in view; but spur gearing remains still the standard. The objectionable use of resistances is done away with on storage battery motors by grouping the cells, which represent about 2 H. P. each, into series, so that the operator may switch only one set or all into the circuit, and thus obtain a current of variable intensity and pressure. If but one motor on a direct system circuit was in use, it would be possible to apply the same principle in the direct system, but in practice there would be a number of motors on a section at once. Some would be just starting and calling for much current and high potential; others might be in full speed and calling for a current of lower pressure and quantity, so that it would be impossible to suit all the varying conditions at once.

A great many trials were made under varying conditions, and one interesting fact among others developed is, that the economy with light trains at higher speeds becomes poorer, apparently contrary to the general principle that the economy of stationary electric motors increases with the speed and the reduction of the load, and many believed that a better showing would be made with such tests. It is true that tests made with light trains of two or three empty cars run at a high speed, but making no stops, showed much better results, but such conditions are not at all practical in operating elevated or other railways. It is true that a lightly loaded stationary motor, running at a nearly constant high rate of speed will show maximum economy, but in the case before us, where the motor was changing its speed continually and stopping and starting, the rule will not apply. To demonstrate the fact, and also to form an estimate of the probable power required at a higher speed than was attained in the trials, the writer has prepared the diagram shown. The base line is laid off in spaces representing speed in miles per hour, from eight to 15; then taking a number of reliable tests at different speeds and with differing loads, and dividing the total weight of the train in tons into the average indicated horse power, we obtain the horse power per ton of train, expended at the various speeds. These results have been plotted, and the ordinates connected by a line which forms a tolerably regular curve, considering the various little changes made in the motor at different times, and the varying atmospheric conditions. The four right-hand ordinates were obtained from tests made entirely by the experts of the electric company. Two were made with two car trains, and two with three car trains (all empty). The other ordinates were taken from tests with four-car empty trains, made by my assistants and myself. The lower lines show the net horse power required at the various speeds per ton of train, as determined by the locomotive tests, and also the required indicated horse power per ton of entire train.

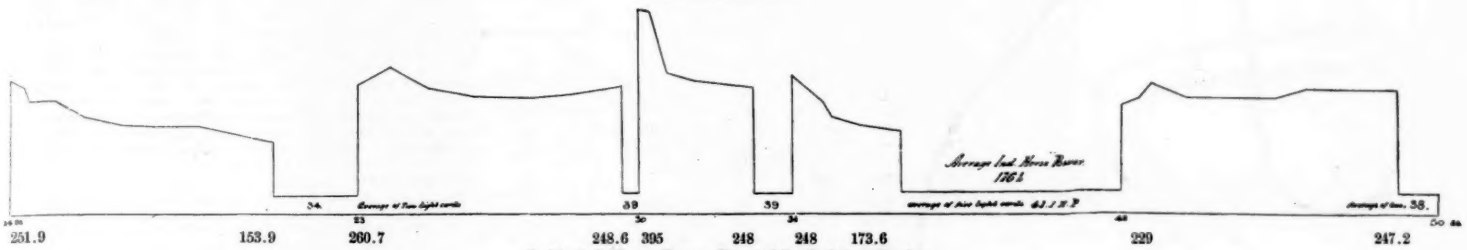
The locomotive, No. 67, was by no means the best on the line, and was not in the best condition, as it had a few days before been equipped with new brasses all around, and newly planed valve faces, all of which require plenty of time and oil to bring their surfaces to a good fit and polish. The cylinders were 11-in. bore by 14-in. stroke. The four drivers were 36¾-in. diameter. The concentrated working weight on drivers was 23,900 lbs. The total working weight was 37,900 lbs. The maximum boiler pressure was 140 lbs. per square inch.

In order to arrive at a conclusion respecting the relative economy of the two systems of motive power, the writer assumes the most tangible measure to be the cost of producing one net horse power at the draw-bar. Under actual working conditions, the locomotives develop on the average one indicated horse power per hour with 6 lbs. of good broken anthracite coal, which costs about $4.20 per long ton on board the engines of of this line. In a short time this expense will be largely reduced by the new coaling plant at the Harlem River. This coal is very good, averages a pound per lump, and generates 7 lbs. of steam per pound of coal, in the average locomotive boiler. The city charge for croton water is $1 per 1,000 cu. ft.

The machinery used in the electric plant was of an economical type, but could have been better still by investing more money in the plant. Assuming that the engine was compounded and used high pressure steam, and assuming that the plant could have been located on the water front so as to obtain condensing water, and assuming that an inferior coal was burned, a high average figure would be the development of one indicated horse power per hour with 3 pounds of coal. Assuming that the inferior small coal would cost, after unloading, trimming, storing, rehandling and delivering at furnaces, $3.30 per long ton, and assuming an hourly consumption of steam of 20 pounds per horse power, with an efficiency of .15 from the prime mover, the cost of 1 net horse power by electricity would be 3.$\frac{1}{10}$ cents.



Profile of Track.

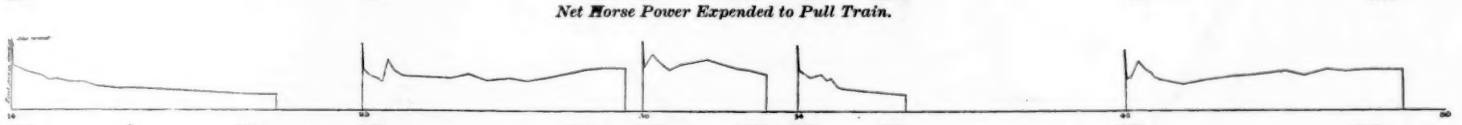


251.9 153.9 260.7 248.6 395 248 248 173.6 229 247.2

Indicated Horse Power Exerted by Driving Engine.

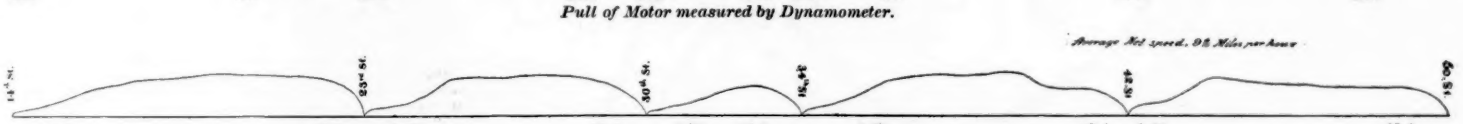
12.9 .5 12 70.2 7.6 47.4 12 26.3 12 49.6

Net Horse Power Expended to Pull Train.



2200 800 2000 2100 2100 1800 2000 900 1500 2000

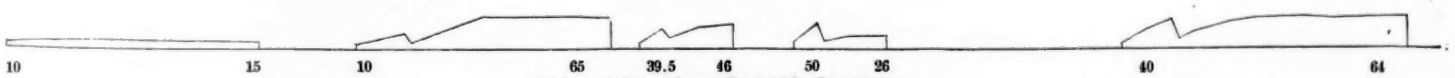
Pull of Motor measured by Dynamometer.



6.81 19.8 6.47 16.1 5.72 14.3 5.97 13 4 6.85 13.0

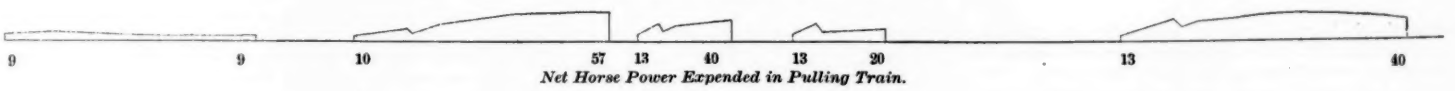
Speed of Train in Feet per Second.

Test of Electric System.



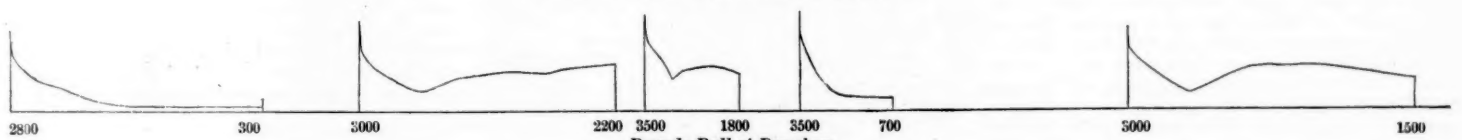
10 15 10 65 39.5 46 50 26 40 64

Indicated Horse Power Exerted by Locomotive.



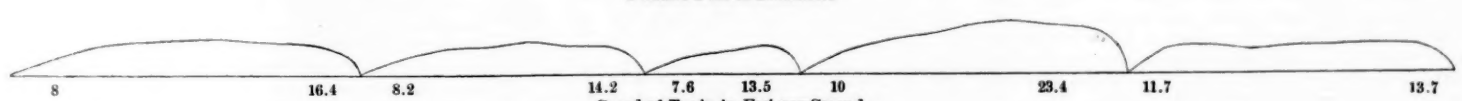
9 9 10 57 13 40 13 20 13 40

Net Horse Power Expended in Pulling Train.



2800 300 3000 2200 3500 1800 3500 700 5000 1500

Pounds Pull at Drawbar.



8 16.4 8.2 14.2 7.6 13.5 10 23.4 11.7 13.7

Speed of Train in Feet per Second.

Low Speed Test of Locomotive 67.

COMPARATIVE TESTS OF LOCOMOTIVE AND ELECTRIC MOTOR.

BY LINCOLN MOSS, C. E., MANHATTAN RAILWAY CO.

In the case of the locomotive the total cost per net horse power hour is $1\frac{3}{10}$ cents. The ratio of cost by locomotive to electric motor is $1:2\frac{33}{100}$. This is entirely exclusive of extra force at generating stations and additional repairs, and there could be no reduction in the working force on board the motors, whether steam or electric.

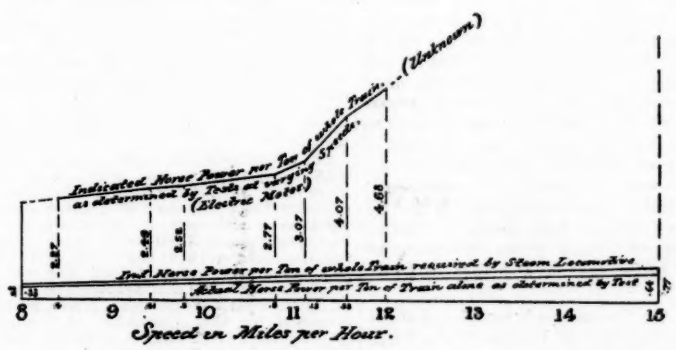
The foregoing estimate can only hold good with reference to the electric motor at a speed of $9\frac{4}{10}$ miles per hour, for beyond that the ratio of indicated to net horsepower rapidly increases, as shown by the diagrams. Carrying out the curve of apparent increase of indicated horse power per ton of train from 12 to 15 miles per hour, it seems very fair to assume an expenditure of nine indicated horse power per ton of train at that speed, which would bring the ratio of cost up to 1:4.7—by applying the previous method.

The question may be asked, what would have been the efficiency, if, instead of one train being run on the trial section, a number of trains had been run? The line resistance and other demands for power when no train was being moved would probably have remained the same, namely, 43 horse power; this constant loss would have been divided among, at most, four trains on this section, which would reduce the average horse power per train, at the low speed of 9.4 miles per hour, to 162.5 horse power, while the net horse power required would remain 26.7, giving an efficiency of $16\frac{4}{10}$ per cent., but, on the other hand, the evidence goes to show that if the speed was brought up to the regular average of 15 net miles per hour the efficiency would have shrunk to about 8 or 9 per cent., and this would again be reduced by lowering the potential of the current to a safe limit.

A conservative estimate, based on these facts, would be that the cost of direct electric propulsion would be four times that of steam locomotion.

The Proposed Bridges at New Orleans.*

The plan published herewith shows the proposed location of the two projected bridges across the Mississippi River at New Orleans, and of the lines connecting them with the various railroads on both sides of the river.


(Unknown)
Indicated Horse Power per Ton of whole Train as determined by Tests at varying Speeds. (Electric Motor)
2.87
2.58
2.58
2.77
3.07
4.07
4.68
Net Horse Power per Ton of whole Train required by Steam Locomotive
Actual Horse Power per Ton of Train alone as determined by Test
8 9 10 11 12 13 14 15
Speed in Miles per Hour.

Power Diagram.

The upper bridge and connecting line is as proposed by the Southern Bridge & Railway Co., Mr. E. L. Corthell, President, and was designed by him. The lower bridge and belt line is as proposed by the New Orleans Terminal Railway & Bridge Co., and was designed by Mr. T. C. Clarke. The latter project has the endorsement of the city government of New Orleans, while the former is strongly supported by the railroads centering at New Orleans, viz., the Louisville & Nashville, the Illinois Central, the New Orleans & Northeastern, the Louisville, New Orleans & Texas and the Southern Pacific.

In our issue of May 16 appeared a diagram showing the general plan of the lower bridge, together with Mr. Clarke's description of it and argument for it. It will be remembered that this bridge consists of three spans, with a grade of seven per cent. from each end to the centre. It is to have a clear span of 1,150 ft. and to be 165 ft. in the middle above high water. It is proposed to work this bridge by a rack railroad.

The upper bridge is to be about 2,700 ft. long between the centres of the shore piers, with a middle span opening 1,000 ft. The clear head room under all the spans will be 85 ft. above high water. The bridge is to be a continuous girder with parallel chords, and with no grade across the main spans. The grade on the approaches will be $1\frac{1}{2}$ per cent. The shore piers of this bridge are to be sunk to a depth of 100 ft. below low water, and the two river piers to 150 ft. below low water. Mr. Corthell proposes to sink these latter piers for the first 100 ft. by the pneumatic method. Wells will be arranged for in the caissons, through the crib work and masonry, and kept closed until the depth of 100 ft. is reached. The wells will then be opened and the remaining 50 ft. sunk by dredging. In consideration of the danger and expense of erecting on falseworks, Mr. Corthell proposes to erect the spans on pontoons and float them into position, much as was done with the Hawkesbury Bridge, and as Mr. Strobel will erect the Ohio Connecting Bridge. The estimated cost of this bridge is $3,000,000.

Mr. Corthell is very strongly of the opinion that the

* Since this article was put in type we learn that the Engineer Board of the War Department has reported adversely to he lower bridge scheme.

PROPOSED BRIDGES AND BELT ROADS AT NEW ORLEANS.

bridge should be above rather than below the city, for many reasons. In the first place, this arrangement he considers preferable in the interests of navigation. The sailing ships which go to New Orleans generally come up the stream in ballast, and are towed up. The tow boats are compelled to keep near the bank going up stream to get the advantage of the slack water and are unable to tow against the strong current in mid-channel. The question of unmanageability of steamers and sailing vessels, and of the difficulty of bringing them into the middle of the stream in time to pass the bridge; the questions of fogs and strong currents, eddies, and of vessels breaking loose on occasions of fire or hurricane, must be carefully considered as bearing upon the location of the bridge below the city. Mr. Corthell also criticises the proposed foundation for the lower bridge. The river piers are formed each of two cylinders 52 ft. in diameter, 90 ft. apart, necessarily disconnected except above the water surface and standing 200 ft. high, to the foot of the towers which carry the spans. He considers it bad engineering to separate the foundation piers in this way, considering their great height. Further, he estimates that the material on which they rest will be loaded with nine tons per square foot. Safe practice in any part of the world would not place more than one-third of this weight on the material on which the foundation must be built. He estimates the cost as at least $5,000,000 and considers it very improbable that a return could be got on this investment, considering also the cost of operating it by the rack railroad. Moreover, the location of the bridge below the city will involve additional expense and loss of time in handling through freight by hauling it 26 miles to cross the lower bridge as against five miles over the upper bridge. From 20,000 to 30,000 cars per annum will be interchanged in this particular traffic.

The presidents of the five railroads mentioned above addressed to the Commission of United States Engineers appointed to consider and report upon the bridge below New Orleans a letter protesting against that location. Their grounds of objection are that in that position "it will be of no use to the railroads, for whose purposes it is alleged to be intended." They do not hesitate to affirm that the railroads will under no circumstances use this bridge, because of its location and of the 7 per cent. grade. They say that it can be readily demonstrated that it would be less objectionable for the railroads to cross their cars by a ferry at the site of the upper bridge. Mr. Corthell's discussion of the question of operating the lower bridge by a rack railroad follows:

The pamphlet to which he refers is one issued by the company proposing the lower bridge, from which we quoted in our issue of May 16.

For the discussion we will use a freight car weighing with its load 31 tons, as this is about the average car now in use, though the 25-ton and 30-ton cars will soon be the most used, and they weigh, with their loads, 37 and 44 tons respectively.

The motive power to be used in hauling trains across the lower bridge is an Abt rack rail engine. In Europe the Abt engine used weighs some 62.61 tons, of this 48.72 tons is on the drivers (three pair) and 13.89 tons upon the trailers. On a 6 per cent. grade the above Abt engine will haul 134 tons in addition to its own weight, or about 4⅛ loaded cars. (See page 6 in the pamphlet.) On a 7 per cent. grade the load will be about 126 tons, or four cars. A consolidation engine weighing, with tender, 75 tons can draw up a 7 per cent. grade, with the Abt rack rail, 382 tons, or 12⅛ loaded cars, and two new style Abt engines of 60 tons weight can handle about 18 cars (pages 4 and 5 of the pamphlet).

Now, an ordinary 75-ton consolidation engine has about 44 tons on the drivers, or 4¾ tons less than the Abt engine, which can haul only 4⅛ cars up a six per cent. grade. The practice on the Abt roads, thus far, seems to be to have the cylinder tractive power, which is applied to the rack rail, a little less than that applied to ordinary traction. In order to handle the load he proposes, on a seven per cent. grade, Mr. Clarke would be obliged to make his cylinder tractive power for working in the rack rail more than double what it is on Abt engines now in use. There will be great difficulty in making an engine that can generate steam enough for this.

On page 6 of the pamphlet we find the traffic of the Harz Railway, for the year 1888, to be 67,500 passengers and 165,000 tons of freight, the entire business requiring 4,210 trains, or an average of a little more than 11½ trains per day (24 hours). If only mixed trains are run, this will give about 16 passengers and 39 1-5 tons of paying freight per train; if one-third of the trains were for passengers only, and the remainder for freight only, we should have, as average train loads, 48 passengers and 59 tons of paying freight respectively. From the above as an example (a road handling less than 60 cars of all classes per day) are we warranted in assuming that the same system would be successful over a bridge which might soon be called upon to handle more than 200 cars per day?

The cylinder tractive power of the Abt engine taken (62.61 tons) is 27,635 lbs., of which 14,016 lbs., or a little more than half, is for simple adhesion. This engine's cylinder tractive power is greater than that of one of the heaviest Decapod engines now in use, *i. e.* 22 in. × 28 in. cylinders and 27,100 lbs. cylinder power. If two Abt engines could work, at their best, on the same train, one as a pusher, the greatest load they could handle would be eight cars. The east approach to the Eads' Bridge at St. Louis is on a 1½ per cent. grade, which is the grade proposed for the approaches of the upper bridge. A six-wheeled switch engine, with 35 tons weight on the drivers, and a cylinder power somewhat less than that used for simple adhesion in the Abt engine, hauls up this grade nearly 500 tons beside its own weight, or about 16 cars. Two engines, one a pusher, handle about 33 cars.

An expert on the subject has stated that on grades of 6 per cent. to 7 per cent., operated by the Abt system, the cost for handling business will be about the same as on a 2½ per cent. grade handled by adhesion alone.

By the use of the Abt system on the bridge an entirely separate set of terminals must be provided near the ends of the approaches at places where they would otherwise be unnecessary. Trains of all kinds, including passenger trains, must have division points, or terminals, at both ends of the bridge. These terminals would be from one to five or six miles from the present terminals of the various roads entering New Orleans.

So far as operating is concerned it may seem, at the first glance, that the extra length of the upper bridge and its approaches would require more time for handling trains than the lower bridge. This, however, is not the case. Two engines per train are to be used on the lower bridge, so, for comparison, we will use two engines per train for the upper bridge.

1. On the lower bridge the maximum train load for two engines is eight cars, and for the upper bridge 33 cars. This would make the time required for switching, etc., in the two cases as four to one in favor of the upper bridge.

2. On account of the short trains, together with the motors used and greater quantity of switching necessary for the lower bridge, a larger number of sidings will be required close to the ends of the bridge. These will necessarily increase the distance trains must travel in making a round trip.

3. European practice seems to indicate that an average speed of about seven miles per hour is all that should be allowed over a line operated by the Abt system. This speed would then be, approximately, the average allowed over the lower bridge.

4. On the upper bridge no limitation is necessary. Trains will pass over at an average speed of from 18 to 20 miles per hour. The speed of the train, taking its complete round trip, will average enough faster to fully make up for the difference in distance without counting the delays on the lower bridge caused by the extra switching. At the upper bridge comparatively little side track room will be needed, since a heavy pusher is all that will be necessary to assist any train over the bridge, in addition to the engine required to haul the same train over the various lines using the bridge.

5. The advantages in favor of the upper bridge, due to its operation by standard engines and the elimination of special machinery, is estimated as two to one. An operating man, to whom the entire question was referred, stated that the capacity of the two bridges was about as six to one in favor of the upper bridge.

6. The saving by the upper route of from 10 to 20 miles in the distance, which through cars have to be hauled, should also be credited to the operating account of the upper bridge.

Grouping results, we have the following:

(a) The train load for the upper bridge is about four times that for the lower.

(b) For a given number of cars the necessary switching at the upper bridge is only one-fourth of what is required at the lower bridge.

(c) The wear on motive power, on track and bridge, and the consumption of fuel will be much less for the upper bridge than for the lower one, because, for a given volume of traffic four times as many engines must pass over the bridge in one case as in the other.

(d) Aside from the extra distance traveled by the Abt engine it must use considerably more fuel than ordinary engines, as the cylinder power developed in the Abt engine is almost double that in ordinary engines.

(e) The lower bridge does not gain anything from being shorter than the upper one, as trains have to run enough slower to fully make up the difference.

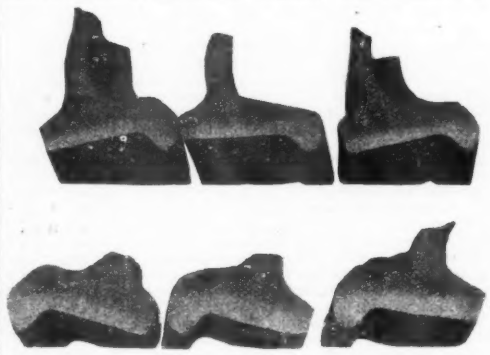
(f) Every car of through freight passing over the lower bridge must be hauled from 10 to 20 miles further by the railroads than if it passed over the upper bridge.

Whiting's Wheel Foundry Plant.

The foundry plant illustrated is that in use by the Detroit Car Wheel Co. as arranged by the Detroit Foundry Equipment Co. under the patents of Mr. J. H. Whiting. The profits per ton of metal from wheel castings are smaller than those from almost any other class of foundry work, and it is therefore essential that the cost of labor be reduced to a minimum. Since this plant was put in the Detroit Wheel Foundry has been gradually increasing its output per man until at the present time as many as 18 wheels are finished per day per man employed.

Fig. 1 shows the foundry in plan. The small circles *A* indicate the location of the flasks. The circles *B* indicate the annealing pits. The tracks *C* are movable from point to point as desired, being made of light iron ladders upon which small trucks carrying the wheels from the chills are run.

The close proximity of the wheel chills in the foundry floor will be noticeable, and it can be seen that the use of a larger diameter of chill would so materially decrease the number of chills on the floor that a considerable reduction of the foundry capacity would result. It



Chilled Wheels by the Detroit Car Wheel Co.

Average time of pouring, 11 *seconds.*

was found by estimate that one of the new chills in the market would, if introduced, result in a reduction of the foundry capacity by 20 per cent.

At the end of the foundry *D* are the seven ladles traveling on the transverse track which supply the 14 rows of chills. These ladles are filled from larger ones mounted on trunnions, as shown at *E*, these last being filled from the cupola *F*.

The patentee of the foundry equipment, Mr. J. H. Whiting, of Detroit, superintendent of this foundry, has recently invented a cupola for use with this equipment. Those here used are six ft. and six in., outside diameter, and in six months time have melted 14,000 tons of iron without relining. The advantage of this cupola lies in the patent tuyeres, which are devised to save the lining and decrease the fuel consumption. They act to distribute the blast evenly over the contents of the cupola.

The operation of this equipment is as follows: Over the floor of the foundry and over each line of chills,

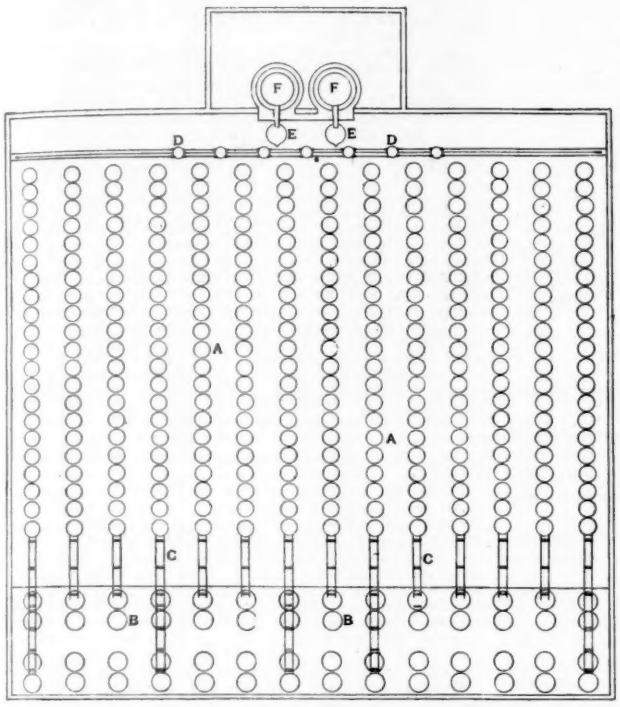


Fig. 1.

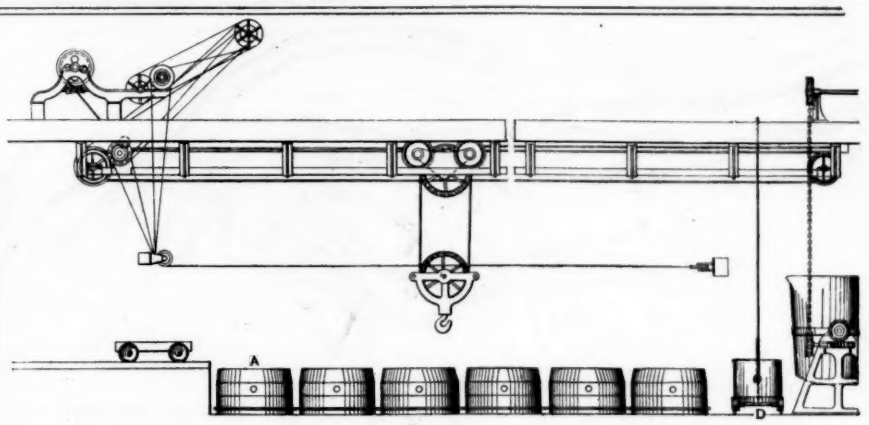


Fig. 2.

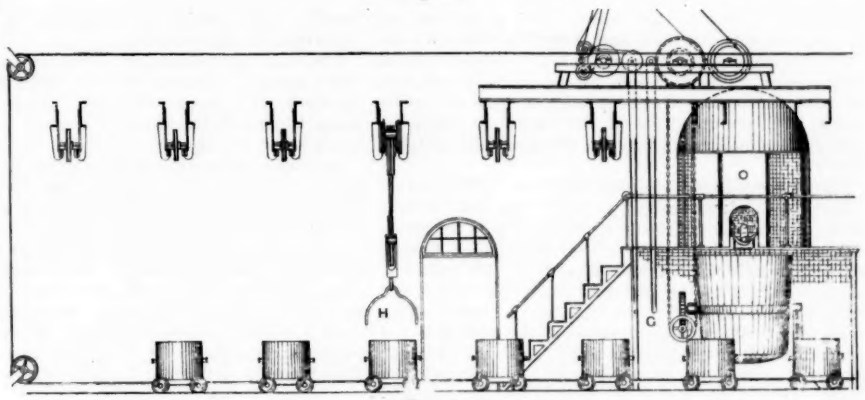


Fig. 3.

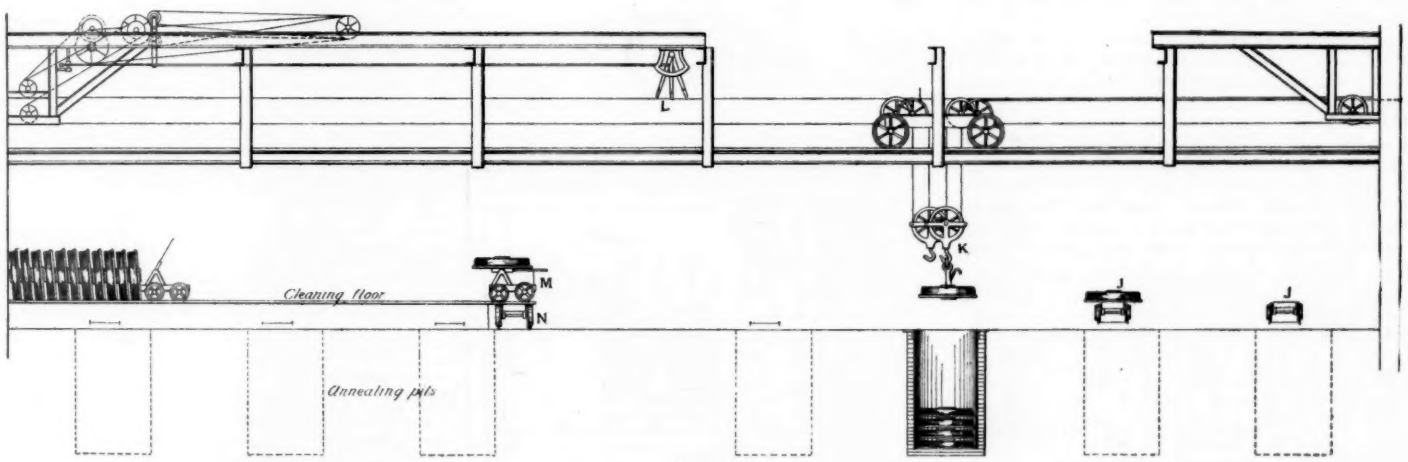


Fig. 4.

CAR WHEEL FOUNDRY PLANT.

DETROIT FOUNDRY EQUIPMENT CO.

shown in fig. 1, is a carrier which transports the hot iron from the track at *D* to the various chills *A*, as shown in fig. 2. The trucks on the track *D* are all linked together, and a man located at *G*, fig. 3, operates the entire carrier system as far as the end of the line of chills. By the movement of the handle shown the train of ladles is caused to pass in front of the cupola, where they are filled, one after the other, until the entire train is loaded. This train is then run by power until the seven ladles are opposite seven of the rows of chills. At this point the man in charge of the pouring on the different rows, lowers the hook *H* and attaches it to the trunnion of the ladle, which is then raised and transported to the chill to be poured, as shown in fig. 2. When the ladle reaches a chill a handle is attached by two men who pour the wheel immediately. The time used in pouring varies from 9 to 12 seconds, after the ladle is tipped to a pouring position. All the movements of lowering, hoisting and transporting the ladles are regulated by the man at the end of the line of chills or by the workmen who pour the ladles. This is rendered possible by having the shifting mechanism operated by long wire ropes which extend over the whole length of the foundry at each line of chills.

When the wheels are cooled sufficiently they are hoisted from the chill by the same conveyor that carries the ladles and are transported to the small trucks at the end of the lines of chills, where a truck is awaiting which transports them to the wheel pit, as shown at *J*, fig. 4, and *B* and *C*, fig. 1.

The wheels are lifted from these trucks by the carrier *K*, shown in fig. 4, which is operated in all its movements by a boy who moves the levers located at *L*. After the wheels are annealed they are put on a transverse traveling truck shown at *M*, which is upon a second truck *N*. In this way the wheel is transported to the cleaning floor and dumped into position without hand labor other than that necessary to tip the truck and to operate the levers which control the movements of the carriers.

This machinery has been in operation for some time, and has more than earned its original cost. The same system is also in use at the Ft. Madison Iron Works, Ft. Madison, Ia., where over 300 wheels are made per day. With seven ladles and seven trucks and the carrier system 400 wheels are poured per day. The iron is poured extremely hot, and is transported from the cupola to the flasks with great rapidity, the lades moving on the conveyers much faster than a man can walk. The average time of pouring a 600-lb. wheel is about 11 seconds. Good wheels are poured in 9 seconds, and some in 6, according to the expertness of the different men. The effect of this hot and quick pouring is, as determined from an examination of a large number of wheels, very satisfactory. Chilled wheels broken under the breaker show a chill which in uniformity and depth would pass inspection without question. Wheels for 1,000 cars for the Pennsylvania Railroad made at this foundry passed the inspection of that company last year without objection, and a measurement of a number of wheels selected at random from the 3,000 in stock showed them to be round within $\frac{1}{64}$ to $\frac{1}{32}$ of an inch, and wheels from this same lot, selected at random and broken, showed a good uniformity of chill, as indicated on the cuts herewith. The threads were free from spots and the plates clear of air holes. One reason for the cleaness of the iron in the plate arises from the use of a patented form of core and section. This core is made as follows: On the lower side of the core, between the two plates, is a groove into which the iron passes before it rises to the top plate. The depth of this groove is nearly 1 in., and it leaves a ring triangular in section about an inch high on the top of the lower plate. Into this passes the dirt, which would otherwise rise and lodge in the upper plate. An inspection of a number of broken wheels showed this ring to be composed of dirt and iron, and proves its efficacy in collecting debris.

The Wheeling Union Bridge and Railroad.

The Wheeling Bridge and Terminal System is designed to connect all the railroads reaching the Ohio River at that city, and Martin's Ferry, O, opposite, and to furnish switching and terminal facilities for them. The plan herewith gives a general idea of the terminal system and of the relative situation of the termini of the present roads. The system includes 10½ miles of track, of which 5.7 miles are main line track and the rest double track and sidings. There are three double track tunnels: 537 ft., 1,205 ft., and 2,460 ft. respectively. The maximum grade is 47.2 ft. to the mile, and the maximum curvature is 10 degrees on the maximum grade and 14 degrees on the level. This is south of Wheeling Creek near the beginning of the tunnel through Chaplin Hill. The rails used weigh 72 lbs. per yard.

The Ohio is crossed by a bridge 2,097 ft. long, with a channel span of 525 ft. This structure has been described heretofore in these columns, and is the one of which the falseworks went out May 25 last. There is a bridge across Wheeling Creek 300 ft. long to the Wheeling peninsula, and another one will be built over the same stream, 275 ft. long.

In Martin's Ferry, on the north side of the Ohio River, there are two bridges, one 112 ft. long, 29 ft. above the street, with three spans; the other, 197 ft. long with four spans of 47 to 51 ft. It is also proposed to build here a single track steel viaduct about 1,500 ft. long, crossing the tracks of the Cleveland & Pittsburgh, one

SKETCH OF THE WHEELING BRIDGE AND TERMINAL SYSTEM.

of the city streets and the county road at one end, and connecting with the Cleveland, Lorain & Wheeling and the Wheeling & Lake Erie, which is now being extended to this point, at the other end. All the tunnels and bridges and other structures of the company are built for double track, with the exception of this viaduct. There are also various minor structures in Wheeling and Martin's Ferry.

The excavation for retaining walls on both sides of Wheeling Creek was recently begun. The plans include walls on both sides of the creek 800 ft. long on the south side and 1,600 ft. long on the north side, and a branch road about a third of a mile long from the main line along the creek to the proposed union passenger and freight station at Market and Eighteenth streets. This work may be abandoned, however, as the awards in the condemnation proceedings instituted to secure the right of way are considered excessive by the company. On the Martin's Ferry side of the river the company has purchased property 200 ft. × 1,600 ft. for yards, and it is also proposed to lay out yards along the Wheeling Creek near the union station.

The part of the work completed comprises the 300-ft. bridge to the Wheeling Creek peninsula, which has one 50-ft. and two 125-ft. spans; the rail level 62 ft. above the creek; also the two small bridges in Martin's Ferry; the Top Hill and Mount Wood tunnels, between the Ohio River bridge and the Wheeling peninsula, 557 ft. and 1,203 ft. long, respectively, and the portion of the main line of railroad from the connection with the Cleveland & Pittsburgh, through Martin's Ferry and Wheeling to the Chaplin Hill tunnel, and also the branch connecting with the Pittsburgh Division of the Baltimore & Ohio.

The part of the work under construction includes the main bridge over the Ohio River, of which only the main span is unfinished. The approaches to this bridge are 317 and 353 ft. long. There are three river spans 250 ft. long and one 152 ft. long, and the main channel span is 525 ft. long. The bridge is 90 ft. above low water. The weight of superstructure is about 4,500 tons. The steel viaduct and the branch railroad to connect with the Cleveland, Lorain & Wheeling, in Martin's Ferry, the Chaplin Hill tunnel, the railroad to the connections with the lines entering Wheeling from the south, and the Wheeling Creek bridge for the branch to the Union Station, are all under construction. About 500 men are at work.

The company owns considerable property on Wheeling peninsula, which it is proposed to offer to manufacturing concerns for building lots. The railroad around the water front, shown on the map, will be built to reach these factories. No work has been begun on this part of the enterprise.

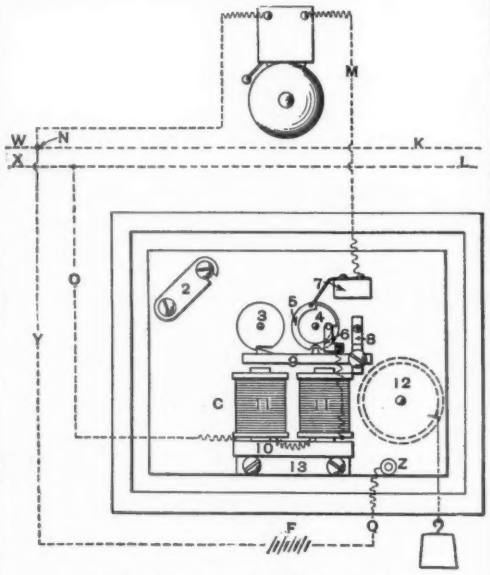
The Wheeling & Eastern Improvement Co. is the construction company building the line. Paige, Carey & Co., 45 Broadway, New York City, are the contractors for the grading, tunneling, masonry, and all substructure work. The Edge Moor Bridge Works are building the Ohio River bridge, and the Wrought Iron Bridge Co., of Canton, O., has the contract for the superstructure work on the smaller bridges. These latter are mostly steel, plate-girder structures. George P. Bissell, of Hartford, Conn., is President of the Construction Company, and Judge R. H. Cochran, of Wheeling, is President of the Terminal Company. Job Abbott, C. E., 150 Broadway, New York City, is Chief Engineer.

O'Neil's Highway Crossing Signal.

The illustration herewith shows the principal parts of the electric apparatus used in "O'Neil's patent standard railway signal" for automatically giving an audible signal at highway crossings on the approach of a train. The track instrument, which is placed at any desired distance from the crossing, consists of a lever, fulcrumed in a suitable bearing, with the short end resting against the under side of the track rail, and the long end provided with a flat spring to make a rubbing contact when this end of the lever is elevated by the depression of the other. The depression is effected solely by the elasticity of the track acted on by the weight of a passing engine or car. The electro-magnets and discs shown in the drawing are placed upon a base with a register which is run by clockwork; and this clockwork, which causes discs 3 and 4 to revolve under certain conditions, governs the time during which the bell shall ring.

The connections shown are for a single-track crossing, where track instruments on both sides of the crossing are arranged to actuate the bell. Wires *W* and *X* lead to one track instrument and *K* and *L* to the other. The operation of the signal is as follows:

On a train passing the track instrument and connecting wires *W* and *X*, the current flows from battery *F* to binding post *Z*, through frame of instrument, to contact spring 6, to electro-magnet 11, wire *O*, wires *W* and *Y*, to battery. This pulls down armature 9, and disc 3 is released and begins to revolve. Discs 4 and 5 start at the same time. No. 4 connects the battery with spring 7 and sets the bell ringing, at the same time breaking the contact at 6 and demagnetizing the electro-magnet. The track instrument now has no effect on the apparatus. The contact at 6 remains broken until disc 5 makes a



O'NEIL'S HIGHWAY CROSSING SIGNAL.
Diagram of Electrical Connections.

complete revolution, which takes four minutes, or any prearranged length of time.

Where the bell is required to ring an indefinite length of time (until the train reaches the crossing) and to cease ringing as soon as the engine has passed, a second register is employed to cut out the circuit from the bell by means of a track instrument placed *at* the crossing.

This instrument has been in use on the New York, Chicago & St. Louis railroad for two years at a point where 200 trains pass daily and has proved very durable. The battery runs six months without renewal. Instruments are now being placed on several roads. The apparatus is made and furnished by the Electric Supply & Manufacturing Co., 113 Public Square, Cleveland, O.

Cause of the Constantly Decreasing Mileage of Freight Cars on Home Roads.*

That it is true that the general average performance of freight cars is constantly decreasing there is scarcely a doubt, although there are no available statistics of a general character to prove the conclusion as an established fact. At the same time it is true that on a majority of the railroads the methods of handling cars, distribution, supervision at stations, records, train services, etc., have been greatly improved during the past 10 years; but in spite of this fact the general average car performance has decreased. This leads to the apparently paradoxical state of things, that upon the whole the efforts of our association to improve the administration of the car service office have been successful, but that the most important results, *i. e.*, increasing car movement, have not been accomplished.

In the year 1878 the White Line comprised 3,520 cars, the performance of which averaged 70 miles per day. In the same year the Union Line comprised 3,828 cars, and the average performance was 78.82 miles per car per day. At the present time the White Line comprises 13,000 cars, and the average mileage is 29.9 miles per car per day. The Union Line now comprises 9,015 cars, and the average mileage is 36 miles per car per day. Other fast freight lines and railroads show similar figures. This condition is not due to any decline in the method of handling cars, so far as the efficiency of the car-service office is concerned.

The car service office has not reached a state of perfection, of course, but it is not less efficient than it was ten years ago. There are, however, forces at work influencing the decrease in the service of cars which are not affected by the most thorough office system. If these forces have any effect at all it is to reduce and not increase the average car performance, as the more thorough and efficient the office work (from a mileage standpoint, which is the controlling factor at present) the less will be the movement of cars empty, the loaded movement being controlled by the quantity of traffic. . . . The trouble is that new cars are being built faster than new tonnage is developed, and consequently a decrease in car movement is inevitable. In the year 1888 according to Poor's Manual there were 70,423 millions of tons of freight moved one mile by all of the railroads in the United States, and the number of freight cars owned by them was 1,005,116. Estimating 15 tons per car, the tonnage was moved with a car performance of 4,695 million miles. At 20 miles per car per day, 1,005,116 cars would in one year run 7,337½ million miles, which, after moving the tonnage of 1888, left 2,642½ million miles, or about 36 per cent. to spare. Certainly an allowance of 36 per cent. for the empty movement is sufficient. There can, therefore, be no increase in the average car movement so long as the increase of equipment keeps pace with the growth of traffic.

If there are sufficient cars for the legitimate wants of traffic, why are more being built? There can be but one explanation, and that will show that the freight car has become so great a factor in the competition for traffic that the *number* of available cars, instead of their performance, is the desideratum. Railroads have been so multiplied that nearly all traffic is competitive, and while the rate and time in transit are the controlling factors, neither can avail without the support of a full supply *of the most improved kind* of cars. I emphasize the words, "of the most improved kind," because the car of 20 tons capacity has not more than forced the 15-ton car from through service, when its own usefulness is threatened by the appearance of the 25-ton car. Not only this, but special cars are being built for different classes of traffic; for instance, furniture cars (the larger, the more favored by shippers), ostensibly intended especially for furniture, but which are an active factor in the competition for all bulky shipments of light weight, such as carriages, household goods, hay, baskets, empty crates, etc. Special horse and cattle cars, refrigerator cars and ventilated fruit cars are also playing well their parts as missionary agents for competitive traffic. A new road is opened and puts on a line of new cars, built after the most approved patterns, and begins to compete for business, and the older lines must have cars equally good or lose their traffic. When the crops are harvested an immense quantity of freight is at once offered for shipment, and the road which has the most cars generally secures the most tonnage. The great delay to the foreign car (the car away from home), both under load and empty, breeds a fictitious demand for more cars, and they are built, when the real practical need is more movement of the cars already built. Under these conditions the equipments of the railroads are rapidly increasing, and the situation is further aggravated by the great influx of cars belonging to private car companies and shippers of special commodities. Many of the former are turned loose to earn what mileage they can, and, being exceptionally good cars, have an advantage over many cars belonging to railroads. Shippers' cars find their way into service by reason of the traffic that they bring to the line hauling them, and it is fast becoming the rule that every shipper of considerable traffic has his own cars. These cars do not increase the aggregate tonnage, but decrease the service of the cars of the railroads. Competitive passenger traffic has already reached a most expensive state—gilt-edged service with vestibuled cars or no business—and to the observing mind it must be plain that competition for freight traffic is fast tending in the same extravagant direction, and that feature which incites the overbuilding of freight cars is the principal factor.

There are, however, other minor causes influencing the over-production of freight cars, and consequently the decreased general average performance, which are directly attributable to the car service office. I refer to the general indifference with which foreign cars and the requests of their owners for their return are treated. We devote almost all our entire energy to following up our own cars away from home. We know that this is mostly wasted energy. When we remember that our own car is the foreign car when it gets away from home, the effect of this principle in the service may be appreciated. It is well enough to talk about delays by reason of billing "to order," overcrowded yards, etc., but the principal cause of delay to the foreign car is that car service officers are dividing their energy among all the other railroads of the country, instead of concentrating it for the movement of cars on the home line. My company has now a number of cars on one of the important lines, and they have been there since last February, notwithstanding our repeated efforts to get them home. The cars have been empty for at least two months. During this time we have received quite a number of the cars belonging to the road in question, and tracers have followed them thick and fast. It is a great mistake to allow cars to stand around loaded or empty unnecessarily, as the cost of the standing room and the retarding of traffic in transit far transcends the mileage consideration. The mileage system of settlement for service of cars interchanged is also a fruitful cause for the building of new cars and the consequent curtailment of the service of the old ones, as the preference of shippers for the new, strong cars so swells the mileage as to return a handsome rate of interest on the money invested, to say nothing about the earnings from the increased tonnage secured.

This question is a vital one in dollars and cents. Placing the low-water mark of acceptable service at 40 miles per car per day, a surplus of 500,000 cars above the requirements of the service is shown. This represents a needless investment of about $250,000,000. Instead of a return upon this enormous investment there is a further outlay for maintenance of $40 per car, amounting to $20,000,000 per annum. The surplus cars must also have standing room, which means 3,310 miles of side tracks, representing an additional investment of about $49,650,000. This side track must also be maintained, and another annual expenditure of about $3,310,000 is involved. Altogether a permanent investment of $299,656,000 and an additional yearly expenditure of about $23,310,000. But this is not all. More locomotives

*A paper read before the International Association of Car Accountants, at New York, June 26, 1890, by W. G. Wattson.

are required and the whole operating service assumes greater proportions than would otherwise be necessary. The question, therefore, involves the consideration of an interest of vast magnitude, and its solution is to be had only through a complete change of practice in supplying and moving cars.

The improvement of car service is not, in its most important sense, a question of operating details, but one of administrative policy. What, therefore, will be the outcome? The tendency of the time is toward consolidation. Will the car service evil reach such proportions as to render the consolidation of individual equipments under independent co-operative companies for various geographical districts the only means of survival? or can such a move be forestalled by the determined and united efforts of this association to reduce the detention of the foreign car both under load and empty?

Mr. Walker on the "Food Products" Case.

The hearing before the Interstate Commerce Commission in the matter of rates on food products began at Washington last Tuesday. The Commission proposes to make an order reducing rates from the territory west of the Mississippi, and the hearing is to give an opportunity to present argument, based upon the testimony taken, why such order should not be made. We have recently discussed the report of the Commission in this matter (June 27), and propose to add nothing to the discussion now.

Mr. Aldace F. Walker, on behalf of 23 railroad companies, submitted a response to the notice announcing the hearing, and moved that the proceedings be dismissed for want of jurisdiction. His argument was an admirable one. He showed that an order putting in effect the conclusions of the Commission's report would reduce rates from 10 to 30 per cent., and would make arbitrary classifications and fix permanent maximum rates without regard to possible future conditions. "Each of the foregoing propositions, if carried into effect, would very largely reduce the earnings of railroad companies engaged in transportation of the products named. Taken together, the result would be simply enormous. The proposed order in every part relates to the rights of citizens. It should be unnecessary to call attention to the fact that under our constitutional government no citizen can be deprived of property without due process of law."

Mr. Walker then proceeds to show the importance of conducting the proceedings of the Commission, as a *quasi* judicial body, upon clear and methodical lines; with distinct charges or allegations to be met; with reasonable notice to the parties in interest; with the usual rules as to the production of testimony, cross-examination of witnesses and presentation of argument. "Unless this procedure is substantially conformed to, the findings of fact are without value under the constitutional system of government by which we are controlled as well as under the practice established by the Commission itself," and an order announced without such conformity is not a lawful order. It is then shown that the Senate resolution under which the inquiry was undertaken contains no complaint, that the allegations made in the preamble are now untrue, and that nothing was contemplated in the resolution further than a legislative investigation. "Without preliminary notice that the Commission proposed to treat the resolution as equivalent to a complaint, every carrier had a right to suppose the contrary. The resolution is carefully drawn, and bears its purpose upon its face. It is a legislative inquiry; only this, and nothing more." No notice was issued to any carrier to satisfy the complaint or answer it in writing. In the investigation evidence was used "obtained without the sanction of any oath and in defiance of all judicial regularity. . . . It is believed and insisted that no order whatever can properly be made 'based on the findings and conclusions of said report.' Those findings and conclusions have not been reached in an orderly way; there is no basis on which an order can stand. . . . Under the recent decision of the Supreme Court of the United States in the Minnesota cases an Act of Congress which should attempt to authorize the fixing of rates by proceedings like those which have been taken in this matter would be clearly unconstitutional. It would have the effect of depriving citizens of their property, or of its use, without due process of law. . . . It is believed that the foregoing considerations are ample to show cause why no order should be made by the Commission in the present state of the matter. The only way in which an order can properly be arrived at is by the institution of proceedings *de novo*, which shall be addressed to particular roads, and shall contain allegations concerning particular rates which are considered unreasonable, and which allegations the parties defendant shall have an opportunity to answer and defend, upon hearing and consideration in the usual way. Such a defense they are ready and willing to make, and when given the opportunity of meeting some specific charge presented by some responsible party, whether it be interested citizens, departments of the government or the Commission itself, they hope to present a sufficient justification for their existing tariffs."

Some Prussian Locomotives.

Mr. A. Brunner, of Munich, has contributed a long article to the *Journal* of the German Railroad Union, in which he urges, as the most effective means of reducing the cost of transportation, the general adoption of the distinguishing features of American rolling stock—large cars on swinging trucks, central buffers instead of the double ones now universal in Europe, and the most powerful locomotives, for which latter he recommends tank locomotives with a truck under the tank end Forney principle) or double locomotives (Fairlie or Mallet type).

The larger part of his discussion is in advocacy of the double locomotive type, which he regards as particularly advantageous for compound engines; but the type he recommends is not anywhere now actually in use, but a design of his own, one of which, for freight service, is now under construction for the Swiss Central Railroad. He compares locomotives of this design for passenger and freight service with the Prussian standard in the following tables which we reproduce with the dimensions in the metrical system, reminding the reader that 100 millimetres (mm.) make nearly 4 in. (3.927), that a square metre (m^2) is about 10⅔ sq. ft. (10.69), the kilogram (kg.) 2.2 lbs. and the ton (t.) 2,204 lbs.; while the steam pressure is given in *atmospheres* (Atm.) = 14 lbs. nearly. Reduced to our measures, the comparisons would be difficult. His proposed double compound passenger locomotive would have cylinders 17⅛ × 24 in. and 28 × 24 in., 6 ft. 2 in. drivers, and a minimum weight of 111,000 lbs. on the drivers, against the Prussian engine with 16 × 22⅛ in. cylinders, 5 ft. 9 in. drivers and a minimum weight on drivers of only 52,800 lbs. Meanwhile, the total weight of engine and tender, empty, would be only 1,320 lbs. greater for the double engine, which is credited with a tractive power 2½ times that of the Prussian engine.

	Pass. loco.		Freight loco.	
CHIEF DIMENSIONS.	I.	II.	III.	IV.
	Prussian standard.	Projected double engine.	Prussian standard.	Double tank engine now building.
Cylinder, diam.....mm	400	440-700	450	355-520
" stroke..... "	560	610	630	630
Driving wheel, diam..... "	1,730	1,850	1,330	1,280
Rigid wheel base..... "	4,500	2,500	3,400	1,800
Total " ..... "	4,500	8,000	3,400	6,300
Heating surface, fire-box..m^2	6.80	13 00	7.78	8.00
" " tubes.. "	96.43	102.00	117.01	117.00
" " total..... "	103.23	115.00	124.79	125.00
Grate surface..... "	1.87	2.25	1.53	1.75
Steam pressure.....Atm	12	12	12	12
Effect. trac. force $\frac{(0.5.\ p.\ d^2.h)}{D}$ kg	3,100	7,600	5,750	6,700
Space for feed water..... t	10.5	8	10.5	5.8
" coal..... "	4	2	4	2.2
Total weight in service with tender, maximum.. "	64.2	60	67	58
Weight of engine in service, maximum ..... "	35.7	60	38.5	52
Weight of engine in service, minimum..... "	35.7	50	38.5	50
Minimum adhesion weight "	24	50	38.5	50
Weight, empty, of engine. "	31.4	46	33.1	45
" with tender..... "	45.4	46	47.1	45
No. axles under engines... "	3	4	3	4
" " " and tenders..... "	6	4	6	4

His double freight engine is one ton lighter than his passenger engine, and about 4,600 lbs. lighter than the Prussian standard freight engine, but has 25,200 lbs. more on the drivers and is credited with nearly one-fifth more tractive force. Both types of Prussian engines have six driving wheels; the double engines, of course, eight. The maximum weight on a driving wheel is 13,090 lbs. on the Prussian passenger and 14,100 lbs. on the Prussian freight engine, against 16,500 and 15,950 lbs. on the double engines.

Mr. Brunner's double freight engine is being built for the Swiss Central Railroad, so that there will be an opportunity to know what advantages the design actually possesses. As he says: "It must not be supposed that I would drive out all standard locomotives with the double engines which I recommend. A man who has had 30 years' experience in locomotive practice in almost every country is not likely to be so wild." It is especially for roads with sharp curves and steep grades, and where an increase in the capacity of the lines is required, that he recommends them.

Automatic Freight-Car Couplers Before the Massachusetts Board of Railroad Commissioners.

A hearing on the above subject was given by the Massachusetts Railroad Commissioners July 8. As previously announced, only representatives of automatic couplers in actual service were to be heard.

The Hinson was the only M. C. B. type coupler present, represented by J. A. Hinson, Vice-President; Frank Bakeman, General Agent, and T. F. De Garmo.

In response to a question from the chairman, Mr. Bakeman announced that his company had received orders from, and the Hinson coupler was in service on the following roads and transportation companies:

Rome, Watertown & Ogdensburg.
New York, Ontario & Western.
Lehigh & Hudson.
Poughkeepsie Bridge Co.
New York, Susquehanna & Western.
Buffalo, Rochester & Pitts urgh.
Western New York & Pennsylvania.
Loraine & Wheeling.
Delaware, Lackawanna & Western.
Charleston, Cincinnati & Chicago.
East Tennessee, Virginia & Georgia.
Cleveland, Cincinnati, Chicago & St. Louis.
Flint & Pere Marquette.
Michigan Central.
Detroit, Lansing & Northern.
Chicago & West Michigan.
Toledo & Ohio Central.
Kentucky Central.
Queen & Crescent Route.
Louisville & Nashville.
Columbus, Hocking Valley & Toledo.
Denver & Rio Grande Western.
Rio Grande Western.
Monterey & Mexican Gulf.
Houston & Texas Central.
Union Pacific.
Illinois Central.
Cape Fear & Cincinnati.
California Fruit Transportation Co.
Iron Car Co.
American Steel Car Co.
Arms Palace Horse Car Co.
Hicks Stock Car Co.
Burton Stock Car Co.

It was also stated that the Hinson Company had received trial orders from 28 other roads. The company reports couplers sold previous to May 1, 18,200; since May 1, 16,800; total, 35,000.

Complete blue prints and models were exhibited, and the construction as compared with other vertical plane couplers was explained in detail. Mr. Bakeman claimed for his coupler economy in first cost and maintenance, the company guaranteeing the couplers for one year, absolute safety in operation, with no occasion for men to go between the cars while in service.

The Chairman inquired if the Hinson Company had any testimonials from railroads using the coupler.

In reply Mr. J. T. Chamberlain, Master Car Builder of the Boston & Maine, stated that he was not present to boom the Hinson coupler, but during the two years he held the position of Superintendent of the Burton Stock Car Co.'s works he had equiped 200 cars with the Hinson coupler. He knew of but one failing, but he did not think it fair to presume that it was the fault of the coupler, as the entire end of the car was torn off and the drawbar gone.

Other coupler men were present, but their couplers were of the link-and-pin type and were couplers not in actual service. Arrangement was then made for the commissioners to examine and test the Hinson coupler on two cars of the Boston & Maine road at the yard in Boston, Wednesday, July 9.

The test and examination of automatic couplers was closed Wednesday noon, the only one represented being the Hinson. Two cars equipped with the Hinson freight car coupler were shown to the Commission in the yards of the Boston & Lowell. The couplers were subjected to all of the various trials usually proposed at such tests, many of them being suggested by practical railroad men, of whom there were many present, nearly all of the Boston roads being represented. The coupler did not fail in any of the tests undertaken, coupling on simple and reversed curves at various speeds. An important feature of its work was coupling automatically with a common link-and-pin coupler.

American Names for Electrical Units.

At the regular monthly meeting of the American Institute of Electrical Engineers, held June 17, 1890, the following resolutions, recommended by the council, were introduced by Mr. Francis B. Crocker, with the request that they be taken up for action at the next meeting of the institute in September:

Whereas, It has been the custom in the nomenclature of electrical units to perpetuate the names of men who have contributed most to electrical science, and

Whereas, In the names thus far adopted the eminent services of Americans have not been recognized, therefore

Resolved, That in the opinion of the American Institute of Electrical Engineers, a just distribution of the honors thus bestowed necessitates a recognition of the splendid contributions to electrical science of one or both of America's great electricians—Benjamin Franklin and Joseph Henry; and,

Resolved, That this Institute will gladly co-operate with other bodies in this country and abroad to secure the general adoption of these names for electrical units; and,

Resolved That the name of Henry should be given to the practical unit of self-induction, since he was the discoverer and greatest investigator of this phenomenon, and because this unit at present time is called a quadrant, which is merely a numerical value, and not a suitable name.

Resolved, That this Institute recommend to electrical societies and electrical engineers the general use of the name Henry for the unit of induction as being the quickest and surest way to secure its final adoption.

It is unfortunate that the name of Henry for the unit of induction was not adopted at the Paris Electric Congress of 1889. If the attention of the congress had been forcibly called to the fact that Henry discovered self-induction and that his work on both self and mutual induction was of the greatest importance, his name would probably have been adopted then. Henry's discovery of self-induction, which is, of course, the fact that gives the strongest claim, was made in 1832 and published the same year in *Silliman's Journal*. In that paper he described experiments showing that the spark obtained by breaking a circuit composed of battery and a long wire is greater than with a short wire, and that the spark is further increased by coiling the wire. He then clearly states that the phenomenon is due to the *action of the current on itself*, all of which is perfectly correct, and would be a good statement of the facts even at the present time.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay.* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

THE new time table of the German railroads, and especially that of Prussia, shows a vast improvement in express train service. The stagnation which appeared to have settled upon the country ever since private competition was abolished, has come to an end. The time tables of two or three years ago differed only in the slightest details from those of 1878; to-day, there is a vast improvement. It is a little hard to tell just what has caused the change. Outside criticism probably had something to do with it. The initiative came from the ministry of public works. As a German railroad man puts it: "We thought that we could not go faster; but one day the Minister said, 'we've *got* to go faster,' and, lo and behold, we did go faster." The ease with which the change has been carried out contrasting with the extreme difficulty attendant upon efforts at faster time in England or America shows that people had previously been taking things pretty easy. Such is in fact the natural tendency of a monopoly, whether in government hands or in that of corporations It removes the temptation to certain abuses, but it at the same time removes a stimulus which is the best if not the only guarantee of efficiency.

We have before now had occasion to speak of the lectures on signaling delivered annually by Mr. G. W. Blodgett, of the Boston & Albany, at the Massachusetts Institute of Technology. We know of no such a course elsewhere in the world, which is surprising, when we consider the importance of careful instruction in this branch of railroading. It is, in fact, a special branch of engineering, and one in which knowledge of operating a road is even more important than knowledge of the mechanical details of signaling. It has, however, certain established general principles which can be taught before actual experience begins, and, in fact, should be. A general knowledge of the mechanics of signals and signaling can also be got without actual practice. For want of opportunities for preliminary education in this specialty most of those who have charge of signaling get it by an arduous and costly road through many mistakes. It would be an excellent plan for others of the technical schools to establish courses of lectures in signal engineering similar to that of the Massachusetts Institute. There might be some difficulty in getting competent men to deliver them, for the number of men who have thorough knowledge of the subject is not yet great, and probably nearly all of them are in active work; but certainly a few men could be found who have the knowledge and the faculty of teaching, and who could take a dozen days from their work in the course of a college year.

Efficiency of the Locomotive and the Electric Motor.

The paper on the comparative efficiencies of an electric motor and a steam locomotive on the Manhattan Elevated Railroad of this city, read before the recent meeting of the American Society of Civil Engineers, is a most important one for two reasons. It is a record of the only scientific comparative test of a steam locomotive and an electric motor doing the same work, and the information given is with respect to a topic of vital interest. The problems treated in this paper already come up occasionally in the practice of many engineers, and as time goes on they are sure to arise often. Several of the great lines have taken up the question of the feasibility of electric switching motors within the past year, and have endeavored to obtain definite information without success, and the elevated roads in Chicago and the projected roads in other cities, notably in St. Louis, have now the matter under advisement. It is true that the large electric companies stand ready to undertake work of this sort, and their confidence in their ability to perform it is shown by their willingness to give the necessary bonds to replace their devices with others if the electric current does not prove to be a practicable means of conveying power to moving trains; but even with a satisfactory guarantee progress is naturally slow up to the point where actual service has proved the possibility of success.

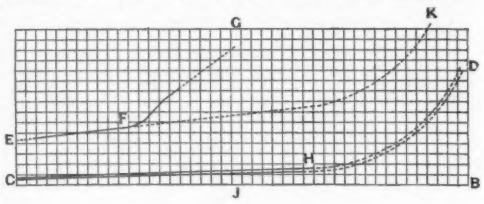
The tests described in the paper were made for the purpose of determining accurately the exact relative value of the electric motor and the steam locomotive for the most conservative and the largest elevated road in the world; naturally, then, one looks to the results as being decisive, and without any contradictory statements would feel inclined to accept them as conclusive. The writer of the paper, who was also the experimenter, has evidently done his work in a most careful manner and his deductions are based on the actual facts collected, with little speculation as to the probable results under different conditions or with other apparatus. He ends with the following conclusion: "A conservative estimate based on these facts would be that the cost of *direct* electric propulsion would be *four times* that of steam locomotion." (The italics are ours.)

If the facts on which this estimate is based are indicative of what may be expected from trials on a larger scale, and the estimates are properly made, then *direct* electric propulsion must be confined to those roads and conditions where the steam motor is impracticable and where the objections to it are obviated by the electric motor. Such conditions will hardly be found except on street railroads.

We have italicized the term "direct" because the author implies by use of this term in his conclusion and by the argument in the body of the paper that better results might possibly be obtained from the storage battery system. The relative merits of these systems have, however, been well tested on street railroads, and any one familiar with such roads knows what the results have been.

The text of this paper and the diagrams accompanying it will be extensively read and studied by engineers and projectors, who will hope to find assistance in settling the important questions of steam vs. electric propulsion for all manner of railroads, but more particularly for elevated roads, for switching cars in cities, and for general suburban use; therefore it is best that the exact character of the data so accurately collected and the conclusions reached should be brought out by open discussion and, if necessary, criticism. From a careful perusal of the paper it is evident that, while the author has apparently made no errors in the calculations, yet some features of the conditions which give rise to the results reached have not been considered.

Before proceeding to a somewhat limited discussion of some of the conditions under which these tests were made, let us go directly to the results and conclusions reached, pausing only to explain one point, which is necessary in order that a full understanding of the argument may be had. Referring to the power diagram, whereon are shown the comparative amounts of indicated horse power per ton of total train load for the steam locomotive and the electric motor, it will be seen that the increase of indicated horse power as the speed increases is, at the stationary engine, about in the same ratio as the increase in the indicated horse power in the locomotive up to 10.8 miles per hour. Those who are familiar with the operation and theory of electric motors and dynamos know that there is a point beyond which such a machine, quite like the steam engine, must not be pushed or operated if reasonable economy is to be expected. Reference to any of the good works on the subject will show a curve of efficiency of electric motors for varying horse power not unlike the curve shown by the power diagram above referred to. Also the steam locomotive has its limit as well, and when overcrowded the curve representing its efficiency is not materially different from that of the electric motor. The diagram herewith (No. 1) will clearly illustrate this. The line *C D* represents the variation in the cost of an indicated horse power on the drawbar of a locomotive when used with varying total output from its normal capacity to its extreme power. The cost at the point *C* may be taken as that of an elevated road locomotive when hauling four or five cars, while that



No. 1.

at the point *D* is a reasonable estimate of the cost—surely enormously increased—which would ensue if any one should be so unwise as to attempt to haul one of the "limited" trains out of New York or Jersey City with such a locomotive. So likewise the line *E F G* shows the change in cost of a horse power at the drawbar of the electric motor under varying conditions of load. From *E* to *F* an increase in load produces but a reasonable change in the economy of action—about the same as with the steam locomotive. From *F* to *G* the motor is overcrowded and the economy suffers just as the steam locomotives in question would if attached to the "limited train" and as indicated on the diagram from *H* to *D*. Both curves have the same general shape, just as both—or any other, and all, for that matter—machines can be used economically or can be overcrowded and worked with low efficiency. A case in hand in regard to the locomotive will be sufficient to illustrate this: Take the experience of the Michigan Central Railroad. They had in operation a number of light eight-wheel locomotives pulling heavy trains. They procured some 10-wheelers of double the capacity and put them into the same service, and the actual saving in coal alone, to say nothing of repairs and train hands, was 60 per cent., as stated by the officers of that road. The old eight-wheelers, being of small capacity, were working in that portion of the curve from *H* to *D*, while the 10-wheelers were not overworked, and their efficiency is found nearer to *C* than *H*.

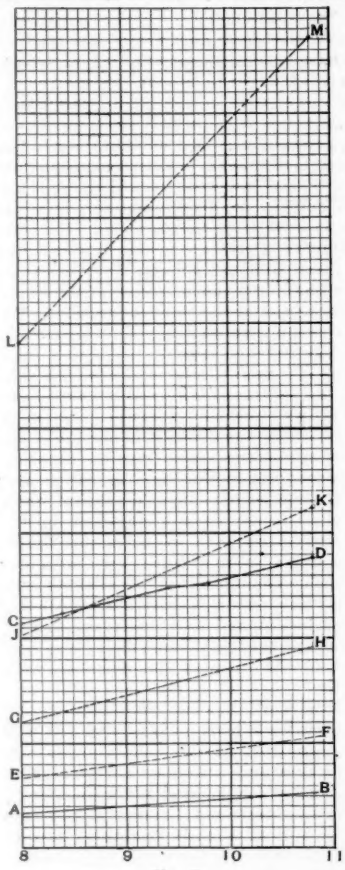
Some little proof that the electric system was overcrowded in the case in point may be needed at this point. In presenting this it must not be forgotten that the dynamo is a part of the system and that the method of making comparisons has included losses in the dynamo as well as in the motor.

At 12 miles per hour the indicated horse power per ton of train load is given as 4.68. At that time the train load was about 55 tons. The total indicated horse power then was about 260. This power was being generated by four dynamos rated at 50 horse power each, or a total of 200 horse power. Dynamos when used at the full rated power are not economical, and in this case, as they were used considerably above the rated power, they had probably passed the economical point, and any increase in demand upon them, such as was the case as shown by the power diagram, must necessarily have caused them to work at a point of low efficiency, and any loss from this cause is charged to the electric system rather than to lack of facilities for experiment, as it should have been. If there had been more dynamos in the stationary plant, or larger ones, then the curve of the power diagram beyond 10.8 miles per hour would have been nearer to a continuation of the straight line *E F* rather than to *G* as shown.

Leaving aside the question of the unnecessary amount of loss due to leakage of the line—which was too great at 43 horse power—let us examine the motor itself. When receiving an abundance of current, it is stated that "the motor did not possess sufficient power to slip its own wheels against the friction due merely to the actual weight upon the wheels." The maximum pull in a test to determine this, if possible, "was 4,500 lbs., for an instant, on a dry track, which is often sanded at that point by the engines hauling express trains." On the other hand, the locomotive with which this motor was compared was capable of exerting a *steady* pull of 7,200 lbs. on a dry rail, and when the rail is sanded, as stated was at times necessary, this pull becomes fully 9,000 lbs. Then there is that uncertain statement "4,500 lbs., for an instant." *For an instant* the steam locomotive will exert 15,000 lbs. or more. But further speculation regarding the possible hauling powers aside, is there not sufficient difference between 4,500 and 7,200 to show clearly that the two motors were incomparable as to capacity, and, therefore, when put into the same service were incomparable as to efficiency? And is it straining a point to say that in the case in hand the steam motor was working in the economical portion of the curve of efficiency, as from *C* to *J*, while the electric motor was being driven in the rising or uneconomical portion of

the curve, from *F* to *G*, and at times in the extreme end of the comparatively efficient portion from *E* to *F*? Supposing that the dynamos had been sufficient for the work, say, of 500 rated horse power and of new design, and the electric motor had been large enough to exert all the pull that the steam locomotive could, would it not be that, under those conditions, the curve of efficiency of the motor could be represented by the line *E F K*, and while being higher in the scale yet of the same general contour within the same limit of total power? Believing this to be a logical conclusion and accepting the curve of efficiency of the motor between the points *E* and *F* as representing the operation of a well-ordered electric system, and using it exactly as shown on the power diagram, the experiments have a somewhat different meaning than that given in the conclusions and deductions in the paper, as shown in the following:

Assuming the power diagram to be correct between 8 and 10.8 miles per hour, and that it is a fair representation of the relative amounts of the indicated horse power in the locomotive and the stationary engine, we have the following comparison of economy shown in diagram No. 2, whereon the lowest line is the base line; the line *A B* the indicated horse power of the steam locomotive per ton of total train load at the different speeds given at the bottom of the diagram. The line *C D* represents the indicated horse power in stationary engine per ton of total train load. Between these amounts there is a wide difference, exactly as is shown on the power diagram. Consider now the relative amounts of water used by a locomotive and a stationary engine. The author of the paper assumes a compound condensing engine



No. 2.

located at sea level, where condensing water is easily obtained, connected to a good system of boilers furnishing dry steam. Under these conditions any of the prominent engine builders will agree to furnish a stationary engine that will give out one horse power for each 17 pounds of steam or water used. A minimum estimate of the water used per horse power in a locomotive engine of small size, starting trains frequently, running at slow and varying speeds where the steam is wire-drawn, and the water violently agitated in the boilers, in which also the steam space is small, as it is in all elevated railroad engines, and because of many other uneconomical conditions, is 34 pounds. Taking now the line *C D* as representing the amount of water used per ton of train load per hour in the stationary engine, the corrected line for the water used per ton per train load per hour in the locomotive engine in comparison is shown by the line *E F*.

A stationary boiler with a modern setting working under favorable conditions, such as are readily obtained in actual practice, will evaporate 9 lbs. of water per pound of coal into dry steam. Locomotive boilers sometimes show a high evaporation, in some cases even as great as 8 lbs. when measured from the feed-water put into the boiler; but when from this is deducted the amount of water which passes away with the steam, there remains a much smaller actual evaporation. The same is true of marine engines as shown by the committee appointed by the English Society of Mechanical Engineers in a recent report. Some locomotives show an evaporation of only 4 lbs. of water into *dry* steam per pound of coal used as near as can be estimated, and a fair assumption could not be made greater than 5½ lbs. of water into *dry* steam per pound of coal for elevated engines or for any locomotive working under the conditions which are now imposed on such engines. The figure given in the paper is 7 lbs., but it is too high for working conditions, and is nearer correct for the water used from the tank per pound of coal than for the actual *dry* steam furnished for the cylinders.

If the line *C D* be taken as the coal used per ton of total train load per hour in the stationary engine, then the coal used in the locomotive will be represented by the line *G H*, that line being found by raising the line *E F* in proportion to the amounts of water evaporated per pound of coal in the stationary and the locomotive boilers.

Anthracite coal is quoted at $4.20 per ton on the engines. This is a reasonable figure; but the $3.30 given for coal for the stationary boilers is too high, and with any of the several improved methods of handling and with automatic stokers such coal as can be readily used should not be charged at more than $2.50 per ton in the furnaces of the boilers at the sea level in New York City.

If, then, the line *C D* represents the cost of coal per ton of total train load per hour for the stationary boilers, the line *J K* will represent the cost of coal per ton of total train load per hour in the locomotive. It will be noticed that this line passes above the line for the stationary engine, and that on this basis—which certainly is a conservative one so far as the figures are concerned—and taking the power diagram given (determined as it was from conditions wholly and decidedly unfavorable to the system of electric propulsion), it is seen that the cost per useful horse power can readily be estimated as less with the stationary boilers and engines and the electric transmission than with the locomotive.

Supposing now we go one step farther and inquire into the conditions existing at Chicago, where several elevated roads are projected and two are partially built, and where reliable information with regard to this matter is now anxiously sought for. In that city the coal for the stationary engines should not be charged at more than $1.50 per ton, while the anthracite coal called for by the city ordinance is worth $6 per ton. If in that locality the line *C D* is taken as the cost of coal per ton of total train load per hour with bituminous coal in the stationary engine, the cost of the anthracite coal per ton of train load per hour in the locomotive engine will be represented by the line *L M*, which shows a decided economy in favor of electric propulsion, taking, it must be remembered, *as a basis the actual results obtained on the Manhattan elevated road* under conditions unfavorable to the electric system.

Now, we do not say that this necessarily proves that the electric current should be used as a means of conveying power to elevated railroad trains, but we do say that any engineer taking up any of the diagrams given with this paper, and making due allowances for the differences in the economies of the two types of engines, namely, the stationary and the locomotive, and allowing a fair estimate for the cost of the two kinds of coal which it is necessary to use, will find in every instance that the cost of hauling trains will be no greater with electricity than with the steam locomotives. The calculations are easily made, and the information given on the diagrams, together with the well-known economies of the two types of engines, is sufficient to reach the results that we have indicated.

We offer these deductions, not in a spirit of criticism, but merely with the desire of showing that this question has two sides to it, and this data, like all other taken under conflicting conditions, is capable of indicating contradictory conclusions, and we do not believe that any one interested in railroads is justified in accepting the statement that the cost of direct electric propulsion will be four times that of steam locomotion until after a careful investigation of all of the information presented in this most interesting paper.

Having hinted at unfavorable conditions for the system of electric propulsion, we should point out a few of them that are most conspicuous. It is easy to see the cause of the enormous loss at starting. It was due to the lack of power in the armature to turn the wheels. If the armature had not turned at all, an enormous horse power in current would have passed through the machine, and the efficiency, instead of being two per cent., as stated, would have been zero. If, on the other hand, the motor had been sufficiently large to do the work, and the armature had started to revolve immediately upon the application of the current, some useful work would have been done and the efficiency would have been much greater. This action is peculiar to electric motors, and is equivalent to removing the cylinder heads of a steam locomotive and allowing the steam to rush through, meanwhile wondering at the lack of efficiency.

There is one element of the efficiency of operation of electric motors that is not well stated. It is with regard to the variation of that efficiency with the speed. The nearer the counter-electromotive force equals the direct, the greater is the efficiency, and also the faster the motor turns within well-defined limit for each particular car, the greater its economy.

It is stated that the motor dynamo was said to possess 120 horse power, but nothing seems to have been known definitely about it. It may have been less, and possibly more. It is not stated at what speed this motor could develop such horse power. If at a high speed, then necessarily it was working at an extreme disadvantage at low speeds, and it could not be expected that it could start a train from a standstill with any reasonable degree of economy. During the heavier experiments additional resistance was introduced, showing, according to the reasoning given, that the current put through the motor was of greater volume than the motor could stand without injury, the resistance being introduced to prevent the burning out of the motor, and the pressure being increased in order to retain the same power.

It is very unsatisfactory to know that the comparative hauling powers of the two machines were as 7,200 steady pull to "4,500 exerted for an instant," yet it is stated against the electric motor that it could not accelerate the train to an average working speed. It would seem as if here alone was sufficient explanation of the lack in power, and perhaps efficiency, of the electric system. It was evidently worked far beyond its capacity, and, therefore, as with every other machine, its efficiency had been much decreased. It is stated that 43 horse power was necessary to excite the line when the electric motor was not being used, and yet this horse power was charged wholly to the one motor, whereas in actual service it would have been distributed over several motors; and if the line had been in good condition nothing like that amount of horse power would have been needed to keep it fully charged when the motors were not in use. Those who are familiar with the experiments with dynamometer cars on surface roads will hardly be satisfied with measurements of velocity that depend upon the accuracy of the estimate by the observer as to when a train is at the middle of an intersecting street. In elevated service the variation in velocity in a distance of one block is considerable, and as found in surface line work the inertia of the train during the increase or decrease in velocity is sufficient to render unsatisfactory the readings of the tension on the draw-bar unless they are carefully corrected by the most accurately measured changes in velocity.

Nothing is proved by stating that the net horse power actually exerted upon the train is least when the train is being started in the case of the electric motor, because what is wanted at the time of starting is a strong pull, not necessarily a large horse power. Locomotives when starting the heaviest express trains exert but little horse power, and an electric motor connected directly to the axles by means of gears and whose speed varies with the speed of the axles would not be considered well designed for railroad work unless the size of the armature and the ampère turns on the magnets, together with the amounts of iron in both, were such as to give sufficient initial pull to start the train.

These are not all. There are other adverse elements in the conditions which might be pointed out if space permitted, for instance the type of gearing used, the method of inserting the resistance, the design of the motor from an electrical standpoint, and others of equal importance where so much depends upon the relative results, as in this particular comparison, at the present stage of the development of the electric locomotive.

The Time Interval Between Trains.

The Boston & Albany has recently made the time-space between passenger trains fifteen minutes, it having been ten before. The rule applies, however, "unless the time-table gives authority to do otherwise," and in point of fact a number of trains are scheduled to run only ten, eight or five minutes apart, and we notice one leaving a station only three minutes behind another. The new rule would seem, then, to be, like the old one, subject to so many exceptions that its force is likely to be greatly weakened. Trainmen who are familiar every day with a five minute space, and who can see that this is regarded by the management as a safe interval, will require close watching to keep them to the rule. And the interval will be shortened not only by those who are inclined to take risks for the sake of saving a few minutes, but by others who will form confused ideas as to when the rule applies, and when it

does not. If two trains scheduled at five minutes apart are both behind time, the minimum interval, by the rule, still remains five minutes. If two others scheduled thirty minutes apart are both behind time the station agent must keep them 15 minutes apart; but will he always clearly see this distinction? And if he sees it, will he be able to find any reason in it? It is true that the first train is generally faster than the following one, in the cases referred to in the time table, but if the second is light, and the preceding one is heavy, the second runner will keep up with the leader whenever he is behind time; and engineers do this a good deal when they are not behind time.

The rule referred to says, "passenger trains of the same class," but as no classification is given on the time table one is left in doubt whether this means anything or not. The names given to trains are Express, Express Passenger, Passenger, Accommodation Passenger, and Special; and in addition there are a number of passenger trains with no name except the destination, and several trains of empty cars and one "Adams Express," which evidently have passenger train rights. These names may indicate the class, but some of the slowest sounding of them apply to trains that run fast, and some of the expresses run at very moderate speed.

The Boston & Albany has plenty of good precedents for making a long interval. One of the best superintendents we know of used to order sections of passenger trains to keep 45 minutes apart (before he had a block system). We never could learn, however, the difference between two sections of one train and two independent trains, as far as the necessity of keeping them apart is concerned, and the question arises, Why not block the trains a station apart if the time interval is to be so long? If brakemen will not go back with a flag in 10 or 15 minutes, what assurance is there that they will go in 45? The Pennsylvania's rule for passenger trains, where there is no block system, is five minutes apart. This maintains a distance between trains running 35 miles an hour of less than three miles, and between those running at 50 miles of less than 4¼ miles; and a brakeman traveling four miles an hour would get back only about 1,600 ft. before meeting a following train. This necessitates the *invariable* use of a good power brake and allows but a small margin for miscalculations. We prefer to see the interval too long rather than too short, and do not bring up the Pennsylvania rule for the purpose of advocating it; but it is interesting in this connection as showing a marked difference between the views of the officers of two prominent roads, both looked up to as models in their way.

The Boston & Albany's freight trains are kept five minutes apart, which, at the rate they are scheduled, about 15 miles an hour, gives a brakeman time to get back with a flag only about 1,400 ft. This would indicate that the long interval for passenger trains is intended as an extreme precaution, taken for the safety of passengers, rather than as a remedy for any defect discovered in the working of the previous rule. The Baltimore & Ohio's time-space rule, seven minutes for all trains, to be lengthened to 10 minutes whenever a fog comes on, is better than the Pennsylvania's because more time is allowed, and it has an advantage over the Boston & Albany's in the uniformity of the rule for all trains. Seven minutes, uniformly maintained, is better than a 15-minute interval which engineers can reduce to five or less.

Freight Rates in Prussia for the Last Ten Years.

In an article on the development of the freight tariffs of the Prussian State Railroads during the past ten years, the *Archiv fur Eisenbahnwesen*, which is published by the department in charge of these railroads, gives some interesting figures, which are more trustworthy than most such statements, because the Prussian Ministry of Public Works possesses more complete statistics than can be found elsewhere, and the employés of the department do their work with Prussian exactness and conscientiousness.

The modifications of rates during the period in question have not generally been what would seem great in this country, but it is claimed, and doubtless truly, that very great care has been taken in all cases where rates have been changed, to adapt them to the wants of the country, and nearly all have resulted in reductions, and under them there has been a great development of traffic. The fact that freight traffic (tonnage-mileage) of the State Railroads was 56½ per cent. greater in 1888 than 1879 is, of course, partly due to the great increase in the length of the system meanwhile; but the increase in traffic per mile, which was no less than 31 per cent., must represent very fairly the development of the freight business. Meanwhile, the average rate received per ton per mile decreased 9.1 per cent. The rates of the several classes have not usually been reduced so much, but the traffic carried at low rates, such as coal, has grown much faster than other traffic. This, however, applies to our railroads to a greater extent than to the Prussian lines. Most of the cases where enormous reductions on our railroads, especially Western roads, are shown in the *average* rates per ton per mile within five to ten years are due to a great growth of through or other low rate traffic, while the other traffic grows less rapidly. In many cases where there has been substantially no change in the tariffs there is a large decrease in the average rates, due to a great growth in coal, grain, on other low rate traffic. Thus if a line carried 100,000,000 ton-miles of merchandise at three cents per ton per mile, and 100,000,000 of coal at one-half cent per ton per mile, the total earnings would be $3,500,000 and the average rate per ton per mile 1.75 cents. If then, at the same rates, the coal traffic should grow to 500 million ton-miles, the other traffic remaining the same, the freight earnings would be $5,500,000, and the average rate per ton per mile only 0.917 cent; so that with no change whatever in the tariff there would have occurred a reduction of 47 per cent. in the *average* rate received. All the world over where railroads are managed rationally efforts are made to create additional traffic by making rates which will permit it to move, which must almost always be very low rates; and almost all over the world, it is this low priced traffic which grows fastest, and where it does the average rate grows smaller without any change in the tariffs.

The *Archiv* gives the following statement of average rates and average freight traffic per mile in different European countries, which is worth preserving:

Railroads.	Tons carried— Per mile.	Tons each way daily.	Cents per ton per mile.
Prussian State. . .	594,442	814	1.313
Other German.....	331,190	453	1.558
ustro Hungary.....	363,517	498	1 705
French	322,518	442	1.631
Dutch	244.729	335	1.134
Belgian private	346,265	474	1.372
Italian.....	176,594	242	1.617
Swiss.....	183,252	251	2.450

The figures for the Belgian state railroads are not contained in their reports. The absence of British railroads is accounted for in the same way, German statisticians, like other rational men, not accepting that kind of statistical science which ascertains the amount of traffic and the cost of carrying it by first guessing at the average rate.

The cheapness of the rates in Holland is doubtless due to the great network of canals, which makes it possible to ship by boat from almost any one railroad station to almost every other station in the kingdom. Prussia has a much larger proportion of coal and iron traffic than any other country mentioned, except Belgium, and would naturally have lower average rates; but the state railroad management has been skillful and intelligent, and deserves great credit for its conduct of affairs.

An important announcement of the organization of the New York Air Brake Co. is made in another column, and it is reported that they have already taken several orders for their new presure brake for freight train equipment. The Watertown works are being prepared to turn out 100 sets of equipment per day, and the officers state that when this capacity is attained, additional works will be built in another locality. The new organization works under the patents developed by the Eames Vacuum Brake Co., has ample capital and undoubtedly goes into the field for serious business. Of course it remains to be seen how efficient the new apparatus is, or how serious a competitor it can be for the Westinghouse. Only actual experience can settle these questions; but we trust and believe that there will be no air brake war to bring prices down to the point below which the highest class of work can be done. There is no present occasion for it, as the business is likely to be all that the makers can handle for a good while to come. Any one who goes into this business must remember that the expense of carrying it on is not confined to making and selling his product. He must be prepared to spend a great deal of money to teach folks how to care for and use his brake. This work of inspection and education, including investigation of brake failures, reputed and actual, is an important and expensive part of the Westinghouse business, and it must be reckoned on by any other company which enters the field.

Considerable interest has been excited by a circular issued by the President of the Illinois Central asking the employés of the company to take its stock. In a recent interview Mr. Fish said: "The company has no stock for sale, but it proposes to assist any of its officers or employés to buy one share at a time, at a fair market price, to be fixed when the purchase is made, the purchaser to pay for his share in sums of $5 or multiples there of. On the sums so paid interest is to be credited at the rate of 4 per cent., and when the sum at the credit of any purchaser amounts to the sum at which the stock was bought, he will receive a certificate for his share of stock, and can then, if he wishes, begin the purchase of another share. The purchaser may, however, at any time, have his contract cancelled and his money returned to him with interest. Thus the company assumes the entire risk of a fall in the price of the shares and the expense of doing the work. It is hoped to enlist every frugal person in any way connected with the corporation as a partner, on a basis of the utmost liberality to the small proprietors." It is said that a large number of applications for stock have been already received from the employés.

In our issue of June 20 we mentioned the fact that the tops of the piers of the Hawkesbury bridge had been observed to move up and down stream at irregular and frequent intervals. Since our information was received this matter has come up in the colonial parliament. The minister said that the movement was less than 2½ in. and was considered unimportant. No explanation as to the cause of the motion was made.

NEW PUBLICATIONS.

The Modern Law of Railways as Determined by the Courts and Statutes of England and the United States. By Charles Fisk Beach, Sr., of the New York Bar. Bancroft-Whitney Company, San Francisco, 1890.

One word in the title marks a feature which distinguishes this book from others on the same subject. It is essentially "modern." It does not select those topics where the precedents are best settled and pass over others lightly, but it takes up those which are to-day most important and strives to make the best of a rather contradictory mass of statutes and decisions. Of course, the outcome is not always satisfactory. If the law is really in doubt, with good decisions and precedents on both sides, it requires some courage to say so, but it is precisely the thing which ought to be said.

As a result of this method of treatment two subjects have special prominence, because they are specially important at the present day. One of these is railroad finance, including methods of organization and foreclosure; the other is the law with regard to rates, and particularly the subject of discrimination. It is the latter which will most interest railroad men. The book before us has the merit of presenting, side by side and in compact shape, three different things: The Interstate Commerce law, with the analagous statutes of the states; the American decisions, and the English decisions. The inclusion of the last is a somewhat novel feature, but it is justified, as the author well says:

"Both because of the intrinsic value of what has been done in England toward the building up of a sound and stable system of railway law, and because there is in the United States, among the thoughtful portion of our profession, a growing concern about English decisions and statutes regarding the matter here in hand. Our railway system in America develops in general along somewhat the same lines already adjusted in the mother country, and things with us determine finally into their places much as they have done with our brethren in England. The interest in the British side of the problem may be expected to grow with the better sort of lawyers and judges, and it has been both to anticipate and to foster this tendency that I have given such detailed attention to the statutes and decisions of a foreign jurisdiction."

Of the merits of the work thus laid out, those who are familiar with the author's book on Receivers can well judge. We only regret that he did not carry his individuality a little further and introduce some of those outside considerations which have so much to do with shaping railroad law. Courts and lawyers alike recognize that the law of railroad rates is something now in process of formation. It is less governed by precedent than almost any other department of law, because the circumstances are so new that crude application of precedent is almost certain to defeat its own ends. As between two possible applications of precedent the courts are for the most part ready to choose that which will meet the necessities of modern business. Conflict of law is settled on economic grounds. It is this process which has given so much weight to the decisions of the Interstate Commerce Commission; and we cannot help thinking that a freer use of the same method would have given additional value to the book before us. It would certainly have made it better from the railroad man's standpoint. The author might answer that he was writing for lawyers, and that it was his business to tell what the law is rather than what it ought to be; but we believe that even from a narrow professional standpoint the man who in doubtful cases can predict the direction which events are going to take has an enormous advantage; and that a book which could help him to do so would have the very highest value.

Spon's Engineers' and Contractors' Diary and Reference Book for 1890. New York: E. & F. N. Spon. Price reduced to 50 cents.

This is a diary designed for English rather than for American engineers. It contains the usual diary blanks, four days to the page. Bound with the diary are a few useful tables, the titles of some of the recent technical books, a list of engineering and allied societies in Great Britain and Ireland and other information of some value. Naturally the advertisements are an important part of the publication.

The Electric Railway of To-day. By H. B. Prindle. Boston: E. B. Stillings & Co. Price 50 cents.

As the author states in the preface, his aim is to treat the subject of electric railroads in a popular manner. He gives briefly the history of the application of elec.

tricity to street railroads, and then describes the different systems now in use with considerable detail, but with little technicality. The pamphlet is illustrated with cuts and diagrams of various details. At the end is a list of electric street railroads in America.

TECHNICAL.

Manufacturing and Business.

The Coburn Trolley Track Manufacturing Co., of Worcester, Mass., has received orders within a week for 800 sets of car-door fixtures. Of these, 500 will go to the Baltimore & Ohio, and 100 each to the Pennsylvania, New York, Lake Erie & Western and the Keith Car Manufacturing Co.

The National Railway Water Service Co. has been organized in Little Rock, Ark., with the following directors: T. W. Baird, J. P. Webb, J. S. Pollock, J. M. Hightower, L. R. Stark, H. D. Layman, C. E. Rice, J. Kellogg and John F. Bayle. T. W. Baird is President; J. P. Webb, Vice-President; C. E. Rice, Secretary, and J. S. Pollock, Treasurer. This company has purchased the Laymay-Rice Railway Motor, a machine intended to supply railroad water tanks.

The approaching completion of the new buildings of the Egan Company, at Cincinnati, will enable them to establish a new department which will be devoted to the exhibition of improved machinery in operation—doing exactly the work they are designed to do.

There is no foundation for the recent report that Hoopes & Townsend intend to build new works at Radford, Va., in addition to their present plants at Philadelphia and Wilmington, Del. The report probably arose from the fact that a company called the Townsend-Hoopes Manufacturing Co. was recently organized in Philadelphia to build a rolling mill, and a bolt, nut and rivet plant at Radford.

The new plant of the Union Foundry & Machine Co., on the south side of Pittsburgh, will soon be ready to commence operations. The foundry, which is 90 × 125 ft., made a successful trial heat last week. It is equipped with two cupolas, having a combined capacity of 25 tons. At convenient points in the foundry are erected two 25-ton steam cranes for handling flasks and the ladles of melted iron. The machine shop is fitted with heavy tools for general machine work. It is 60 × 132 ft., two stories, the second story being used as a pattern-making shop. Both the foundry and machine shop are expected to be in full operation by Aug. 1.

The Leechburg Foundry & Machine Co. of Pittsburgh have recently received an order from the Belleville Steel Co., of Belleville Ill., for a hydraulic blow shear, with intensifier, designed by Henry Aiken, of Pittsburgh. This shear works under a pressure of 600 lbs. to the square inch, and is capable of cutting a section of hot steel 10 × 12 in. Its total weight, when completed, will be about 60,000 lbs.

Iron and Steel.

J. W. Maxwell, recently engineer and superintendent of the Whitely Steel Co., has formed a partnership with G. H. Vincent, of Syracuse, N. Y., under the firm name of the Springfield Steel Casting Co., and will engage in the manufacture of steel castings in Springfield, O.

The new armor plate mill of the Moorhead-McCleane Co., proprietors of the Soho Iron & Steel Works, at Pittsburgh, is now in successful operation, and is turning out plates of very large dimensions.

Park, Brother & Co., Ltd., of the Black Diamond Steel Works, at Pittsburgh, are adding six tubulars boilers to their steam capacity in the plate mill.

The Colorado Coal & Iron Co., of Pueblo, Col., have orders ahead to keep the works fully employed for some months. The firm has just completed an order for 10,000 tons of rails for the Denver & Rio Grande, and is now working on an order for 16,000 tons of 75-lb. rails for the Union Pacific. In May 5,000 tons of finished rails were made. From 900 to 1,000 men are employed. The present capacity is 250 tons of rails and 240 tons of pig per day, requiring about 1,200 tons of ore to keep the two furnaces running.

The Pittsburgh Iron & Steel Engineering Co., of Pittsburgh, has been chartered with a capital stock of $100,000 by James Hemphill, Pennock Hart, T. B. Ritter, Wm. H. Conley and John F. Wilcox. The following officers have been elected: President, James Hemphill; Treasurer, W. H. Conley; Secretary and General Manager, John F. Wilcox. It is the intention of the company to contract for all classes of iron and steel works, blast furnaces, structural work, etc., taking charge of the work in its entirety, including freights, erection and general superintendence.

The Maryland, Baltimore & Lackawanna Nut Co., of Baltimore, was incorporated last week in Maryland with a capital stock of $100,000.

The Rail Market.

Steel Rails.—Eastern mills quote $31@$31.50, for fall delivery. At Chicago the quotation is $33.50 also for fall delivery. Nearly all the mills have orders to keep them busy through the summer, and orders for early delivery are hard to place, even at a high premium. The eastern mills secured orders for about 3,000 tons the past week, and large orders were also placed with the Chicago mills.

Old Rails.—The market at New York is quiet, with quotations strong at $24.50@$25 nominally. In the absence of sales at Pittsburgh iron rails are quoted at $27.50@$28.50. In the Chicago market, railroads have sold large lots at $26. Old steel rails are in demand at $21@$21.50 and $18.50, according to length.

The Tower Bridge.

The erection of the steel superstructure of the Tower Bridge, London, has been commenced. The bridge will consist of one central opening of 200 ft. clear and two side openings each of 270 ft. clear. Upon each of the two masonry piers—which are already built in the river—and also on each of the abutments, will be placed four steel octagonal columns, those on the piers reaching to a height of 135 ft. and those on the abutments 66 ft. above high water. These columns will carry steel chains, from which the roadway of the side spans is suspended. For the purposes of the river traffic the central span is capable of being opened, being so designed as to admit of each half rotating in a vertical plane through an angle of 90 deg. In order not to prevent pedestrian traffic while the bridge is thus open, an overhead footway is provided at a level of 135 ft. above high water, at each end of which hydraulic lifts will be provided. William Arrol & Co., of Glasgow, have the contract.

Photographic Copies of Drawings.

Messrs. Keuffel & Esser, New York, have issued a small pamphlet describing four processes of making photographs from drawings. These are known as the blue, chromide dry, nigrosine and cyanotype. The first is the well-known blue process commonly used, which gives white lines on a blue ground. The last three are not extensively used, and give dark lines on a light ground. The following short description of these processes as given in this pamphlet is interesting:

The old and tried "blue process" still holds its own as the most speedy, simple, reliable and economical process for copying tracings. It can be worked successfully by anybody; there is no uncertainty about the result, and the prepared paper, which keeps well, requires only exposure and a water bath for developing. The prints are very plain and the dark background preserves their appearance even under rough handling, as at the work-bench. Corrections and additions are easily made by the "erasing fluid."

Nigrosine Process—Black lines on white ground.—This process is nearly as simple as the blue process, but differs from it chiefly in that it requires a chemical developer added to the water bath. The great advantages of this process are, that it gives a permanent fac simile of the original drawing, permanent black lines on a permanent white ground and the half tones as such. This also overcomes the great drawback of shaded blue prints, which always show light and shade reversed. The paper must be kept carefully protected from light, as it is more sensitive than the blue process paper, and it must be kept absolutely dry.

Chromide Dry Process—Dark lines on light-tinted ground.—This is a dry process which gives prints to exactly the same scale as the tracing from which they are made, as there is no wetting of the print to distend or skrink it. It can therefore be carried on successfully where water is not accessible or is unhandy. The prints have a very pleasant tint. As the ground is not white, but has a slight tint, the drawings are also well adapted for use at the work-bench, as they will not soil readily. The prints made by this process are absolutely indelible and permanent, and the lighter lines and shades are reproduced in the same tone, so that the print is in every respect an exact copy of the original.

Cyanotype Process—Blue lines on white ground.—This is the quickest, but at the same time the most complicated of the several photo-printing processes, and requires considerable practice to carry it on with success. The prepared paper, which is of a decided yellowish color, is very sensitive, and must be carefully protected from light.

Chignecto Ship Railroad.

The annual meeting of the shareholders of this company was held in London recently. The chairman reported that the masonry of the Tidnish lifting dock would probably be completed during the summer, as well as that at the other end of the line. The machinery for the lifting docks has been nearly all manufactured, and the greater part delivered in Canada. The ship's cradles, hauling gear and subsidiary plant are about to be manufactured. The president places the time of completion at July 1, 1892. The idea in completing the earthwork embankments, etc., so long before the actual opening and operation of the road is to allow the roadbed to become thoroughly settled before being subjected to the heavy traffic to be carried.

New Machine Shops.

The Georgia Pacific has let most of the contract for the machinery for its new Birmingham shops at Thirty-fifth street near Avondale, Ala. The work on the foundation for the roundhouse will be begun in a few days.

The Westinghouse Air Brake Co.

The following announcement is made of the appointment of Western and Eastern representatives of this company: Mr. Jno. W. Cloud, Western representative, with office at 974 Rookery Building, Chicago, Ill.

Mr. R. A. Parke, Eastern representative, with office at 160 Broadway, New York, N. Y.

The St. Clair Tunnel.

The history of the progress of the tunnel these days is merely a record of continuous and rapid work on both sides of the river. On the American side a number of men who were engaged in handling clay, under compressed air, at $1.40 a day, asked an advance last week to 25 cents an hour, and went out because it was refused. Men to fill their places were immediately engaged. No delay was caused on the Canada side. The tunnel is making good progress along the old draftway, which was taken out last week. About three-fourths of the whole work is now completed, and the part yet unfinished will, it is thought, be put through more rapidly than any part of the work yet completed.

The Westinghouse Electric Co.

This company has passed into the control of a new organization, the Westinghouse Electric & Manufacturing Co. The stock has been doubled to $10,000,000. Holders of the old stock are privileged to take the new up to one-half of their present holdings at $40 per share; the par value is $50. George Westinghouse, Jr., is President of the new company. The general understanding is that George M. Fullman goes into the new organization, and that he, with the Westinghouse Co., will carry on the manufacture of rolling stock for electric street railroads on a very extensive scale.

Interlocking at Broad Street, Philadelphia.

Last Sunday morning between midnight and 2 o'clock the interlocking in the Broad Street Station, Philadelphia, was changed from the old machine to a new 56 lever machine. Four additional tracks have been taken in, making 12 in all.

THE SCRAP HEAP.

Notes.

One of the piers of the coal dock of the Central of New Jersey at Elizabeth, N. J., gave way July 2, precipitating two loaded coal trains of 92 cars a distance of 20 ft. into the water.

The Iron Car Co.

A committee of creditors has agreed upon a plan of reorganization in the main as follows:

The new company is to have a capital of $2,500,000. Fresh capital in the sum of $600,000 in cash has been pledged by persons already interested in the enterprise, to be secured by a first mortgage upon the assets and equities of the Iron Car Co., and to be used in acquiring the assets, liquidating the indebtedness and carrying on the business of the Iron Car Co.

Fifty per centum of the unsecured debt of the Iron Car Co. is to be paid in notes of the new company bearing date July 1, 1890, at 6, 9, 12, 15, 18, 21 and 24 months from that date with interest at 6 per cent. per annum. The remaining half of the indebtedness is to be paid by the issue of 10-year six per cent. income bonds, secured by a second mortgage. The interest is to be accumulative and no profits are to be applied to the reduction of the first mortgage debt of $600,000 until interest has been paid upon the income bonds for each year as it matures, and no dividend is to be paid on the stock of the new company until the income bonds have been paid in full with interest. It is understood, however, that while the new company cannot apply any of its profits to the reduction of the first mortgage bonds, the proceeds of any sale of car equities or other assets not needed by the new company for use in its business may be applied to the reduction of either its first or second mortgage bonds.

The secured creditors will have the right to hold any collaterals now held by them, such securities to be released pro rata as the extended notes are paid. The holders of any paper made by the Iron Car Co., endorsed and accepted by the Shackleton Co., the Huntingdon Manufacturing Co. or the Minnesota Iron Car Co., may retain their claims against such company.

The creditors of the Iron Car Co. are to be represented by at least one director of the new company while the debts due them remain unpaid.

Creditors desiring to come into the reorganization who have not already assented to the plan of the committee of creditors, represented by Wm. T. Hildrup, chairman, are requested to send immediately assignments and sworn statements of their claims (using the blanks with which they have been previously furnished) to Carter, Hughes & Cravath, No. 120 Broadway.

Fast Time for a French Railroad.

A special train on the Northern of France recently ran from Paris to Calais, 184.14 miles, in three hours 50 minutes, an average of 48 miles per hour. At times the speed was 71 miles per hour. The train consisted of 15 cars and two brake vans. It was hauled by a new eight-wheeled engine, built at the company's La Chapelle shops, and exhibited at the exposition last summer. The drivers are 7 ft. diameter.

A Northern Pacific Train Robbery.

A Northern Pacific freight train was recently boarded at North Yakima, Wash., by two men. When the conductor asked for their tickets they drew revolvers, and compelled the conductor and brakeman to hand over $120. The robbers then jumped from the train and escaped. A posse went in pursuit and captured the robbers.

Dining Cars in Mexico.

The Mexican Interoceanic Railroad, in announcing the opening of its line from Mexico to Jalapa on July 10, also announces that dining cars will be run on through trains. This is the first Mexican railroad that has adopted this feature.

A Robust Yarn.

Many examples are to be found in literature and legend of the development and transmutation of a simple statement into something which its originator would never recognize. A modern instance is now going through the technical press. In our issue of May 2 we published a detailed statement by the President of certain car works of orders to be placed for 21,000 cars that was taken up and expanded and twisted until it reached this form:

"The Erie, Pa., Car Works have orders for 10,000 cars for the Pennsylvania, 5,000 for the Union Pacific, 3,000 for the Missouri Pacific, 4,000 for the Baltimore & Ohio, 3,000 for the New York Central, 2,000 for the Columbus, Hocking Valley & Toledo, and 2,000 for the Cleveland, Cincinnati, Chicago & St. Louis lines."

In the original statement the Erie Car Works were not mentioned; nor was the originator of it the President of those works. In the form quoted above, the story has taken a new life and is going the rounds of our contemporaries. Nobody can be more surprised than the officers of the Erie Car Works, Limited, at the magnitude of the orders thus placed on their books.

The Path of a Point on a Driving Tire.

The Chicago, St. Paul & Kansas City passenger department has issued a circular calling for a solution of the following problem: The distance between St. Paul and Chicago by this line is 420 miles. What is the exact distance traveled between those cities by a point on the circumference of a six foot driving tire. Answers should be sent to W. R. Busenbark, General Passenger and Ticket Agent, Phœnix Building, Chicago. We will hazard as a guess 534.761 miles = 534 miles 4,018.08 ft.

Canal Contracts.

The Dominion Government has called for tenders for the construction of a lift dock, weirs, etc., at Morrisburg, Ont., and the deepening and enlargement of the Rapide Plat Canal. The work will be divided into three sections, each about a mile in length.

Ottawa Street Railroad.

The city corporation has received an offer from ex-Mayor Howland, in behalf of the Imperial Trust Association, to construct and operate an electric street railroad. The capital is to be $250,000; the main line to be complete by June 15, 1891. The offer is dependent on receiving water power.

Merchants' Terminal System.

The Merchants' Terminal Co., of St. Louis, after having spent nearly five million dollars in building the Merchants Bridge and an elevated terminal system in St. Louis, now finds itself in trouble about getting into the Union Depot. It is probable, and certainly to be hoped, that the trouble is only temporary, but the Gould interest will strenuously resist the approach of the terminal company to the depot.

Echoes of the Strike.

It is said that claims for damages against the Illinois Central, as a result of the strike, already reach nearly $275,000. These are principally from shippers of live stock and perishable freight. The cheekiest claim, however, is that of the men, who asked to be paid for the time they were on strike

The New York and the Eames Brake Companies.

The New York Air Brake Co., with a capital of $5,000,000 was organized last week under the laws of the state of New Jersey. At a meeting of the stockholders held on Tuesday of this week the following were elected as Board of Directors: John C. Thompson, Charles A. Starbuck, I. B. Newcombe, R. C. Vilas, all of New York City; George B. Massey, Watertown, N. Y.; J. A. Lebkeucher, Newark, N. J.; William F. Vilas, Madison, Wis. At a meeting of the Board of Directors the following officers were elected for the ensuing year: President,

Royal C. Vilas; Vice-President, George B. Massey; Secretary, Charles A. Starbuck; Treasurer, John C. Thompson.

At the annual meeting of the stockholders of the Eames Vacuum Brake Co., held in Watertown, N. Y., Tuesday, July 8, the following were elected directors for the ensuing year, viz.: John C. Thompson, Geo. B. Massey, A. P. Massey, A. H. Sawyer, C. A. Starbuck, R. C. Vilas, P. W. Scudder, T. G. Carson, E. C. Hodges. On Wednesday, July 9, the directors held a meeting at the company's office in New York City, and elected the following as officers for the ensuing year, viz.: President, John C. Thompson; Vice-President, R. C. Vilas; Secretary and Treasurer, Geo. B. Massey; Assistant Treasurer, H. W. Boyer. A cash dividend of two per cent. upon the capital stock of the company was declared, payable Aug. 15 to stockholders of record Aug. 1, and it is intended to pay quarterly dividends of two per cent. regularly hereafter.

A Wind Storm in Dakota.

A tornado struck Fargo, North Dakota, at 2:30 a. m. July 7, doing great damage to the city. The Northern Pacific repair and machine shops were damaged to the extent of $20,000. The freight depots of the Great Northern and the Chicago, Milwaukee & St. Paul were demolished. A Northern Pacific west-bound passenger train had just pulled out of the yards and stopped at the Milwaukee crossing. The train was made up of three baggage cars, nine coaches and sleeping cars, a private car and the Division Superintendent's car. All of the coaches and the tender were blown from the track, but no lives were lost. The lights had been put out, and there was no fire or steam heat on.

The Freight Handlers Strike.

The strike of the freight handlers at Cincinnati, which began July 3, is still unsettled and now includes all the roads centering in the city, though according to a dispatch of the 9th inst. a full force is now at work on the Pennsylvania and Louisville & Nashville. In all 450 to 500 men have quit work. The companies have thus far refused the strikers' demand for a day of 10 hours and an advance in wages from $1.35 and $1.45 per day to $1.60 and $1.70. The $1.45 now paid is for foremen. The roads affected are the Pennsylvania, Baltimore & Ohio, Ohio & Mississippi, Chicago, Hamilton & Dayton, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati Southern, Louisville & Nashville, Little Miami, Chesapeake & Ohio, and New York, Pennsylvania & Ohio.

Trainmen's Wages on the Santa Fe.

The grievance Committee of the Santa Fé Railroad system has completed its labors, and on July 7 submitted the demands to the managers of the road. The new schedule is substantially as follows: For freight conductors, 3 cents per mile, and for overtime 20 cents per hour. The passenger conductors demand that the grading system be abolished and $125 per month be paid for running 3,500 miles. Over that number of miles they want 3¼ cents per mile. Passenger brakemen demand $55 per month for the same number of miles, and 2¼ cents for the excess.

Light for the Holy Land.

I. A. Williams & Co., of Utica, recently shipped three headlights of their manufacture to Jerusalem, to be used on the Jaffa & Jerusalem Railroad. These are the first headlights ever sent to the Holy Land.

LOCOMOTIVE BUILDING.

The Rio Grande Western has ordered eight more heavy freight standard gauge locomotives of the Baldwin Locomotive Works similar to those recently delivered. Four more passenger locomotives have been ordered of the New York Locomotive Works of Rome, N. Y. The company is also altering ten narrow gauge engines to standard gauge.

The Sinnemahoning Valley road will receive two new locomotives next month.

The 25 locomotives ordered of the Dickson Mfg. Co., of Scranton, by the New York, Ontario & Western are being delivered at the rate of three a day.

The Rhode Island Locomotive Works have delivered to the Marietta & North Georgia two new 60-ton freight locomotives with cylinders of 19-in. stroke.

The Cleveland, Cincinnati, Chicago & St. Louis is receiving 10 new heavy passenger engines from the Brooks Locomotive Works.

The Carolina Central is about to place an order for two six driving-wheel freight engines.

Two new heavy freight engines were received last week by the Louisville, New Albany & Chicago from the Rogers Locomotive Works, making four received during the past few days.

The Brooks Locomotive Works, of Dunkirk, N. Y., have been awarded a contract for 25 eight-wheel locomotives by the Illinois Central. They are to have 18 by 24 in. cylinders, 62 in. wheels and will weigh 104,000 lbs.

CAR BUILDING.

The Denver & Rio Grande has ordered 1,000 cars for freight service and 65 new passenger cars to be placed in service on the standard-gauge line on Sept. 1.

The Louisville, New Orleans & Texas has contracted with the Missouri Car & Foundry Co., of St. Louis, for 400 new freight cars. The contract calls for the delivery of some of the cars in August and the balance in September.

The New York, Ontario & Western has received 500 new 25-ton gondola coal cars from the Michigan Car Co. and 1,000 more are now being delivered by the Lafayette Car Works.

Eight of the 16 new passenger coaches ordered by the Louisville & Nashville have been delivered at Louisville. The cars have Pullman trucks and Westinghouse air brakes.

The Buffalo Mfg. Co. is completing an order for 250 refrigerator cars for the Merchants' Dispatch Transportation Co.

The Lafayette Car Works, of Lafayette, Ind., are building 325 tank cars of a capacity of 72,000 gallons each, for the American Cotton Oil Co., and 225 tank cars of the same capacity, for the Manhattan Oil Co.; the company is also building for the Kansas City Packing Co. 250 Chase refrigerator cars.

The Northern Pacific has received ten dining cars and four first class passenger cars from the Barney & Smith Mfg. Co. of Dayton, O.

A. F. Benson, Batesville, Ark., and J. B. Pinne, Suffolk, Va., will purchase cars for street railroads.

The Columbus, Shawnee & Hocking Valley has received from the Ohio Falls Car Works three of the passenger cars ordered recently.

The Atchison, Topeka & Santa Fe is in the market for 1,400 freight cars, mostly box.

The reorganization of the Iron Car Co. of New York, whose failure was announced some time ago, is progressing favorably. The following firms of bankers have subscribed and paid in $600,000, in cash.: Brown, Bros. & Co.; Vermilye & Co.; Boody, McLellan & Co., and Post, Martin & Co., of New York City. New officers have been elected as follows: Archer N. Martin, President; Conrad N. Jordan, Vice-President, and G. W. Dithridge, Secretary. Creditors are to be paid in full, partly by notes of the reorganized company and partly by six per cent. bonds of the new company.

The following are the officers of the Steel Tubular Car Co., which proposes to build a steel car invented by J. W. Post: John S. Orr, of New York, President; Col. A. I. Wilcox, Vice-President; John W. Post, General Manager, and the following Board of Directors: Henry E. Perrine, Harlon C. Palmer, John G. Valentine, Col. J. A. Marrow, Givon Pike, H. C. Low, M. T. E. Chandler, Col. R. F. Young, H. D. Money and E. John Ellis. The company proposes to establish a new town in McKean County, near Bradford, Pa., to be called Charmony.

BRIDGE BUILDING.

Alexandria, La.—The Union Bridge Co., of New York, has the contract for the iron bridge of the Houston, Central Arkansas & Texas across the Red River at Alexandria. J. H. Hope is Engineer in charge of the work.

Austin, Tex.—A new bridge has just been completed at Fifth street and Congress avenue. The city may soon begin the erection of other bridges within the town limits.

Birmingham, Ala.—The Smith Bridge Co., of Toledo, O., has been awarded the contract for the bridge at Twenty-first street in Birmingham. The following bids were received: Southern Bridge Co., superstructure, $35,846; substructure, $1,650; Milwaukee Bridge & Iron Co., superstructure and substructure, plan No. 1, $36,577; plan No. 2, $37,977; Smith Bridge Co., superstructure, $40,000; substructure, no bid; Edgewood Bridge Works, superstructure, $40,695; substructure, no bid; Chicago Bridge & Iron Works, superstructure, $43,698; substructure, no bid; Shiffer Bridge & Iron Works, superstructure, $50,500; substructure, no bid. The Southern Bridge Co. withdrew its bid and the plans of the Milwaukee Bridge & Iron Co. were not accepted.

Charleston, W. Va.—The contracts for the new bridge over the Kanawha River at Charleston have been let to the Keystone Bridge Co., of Pittsburgh, and Jutte, Stratton & Co., of the same city. Work has been commenced.

Columbus, O.—The City Engineer has been directed to prepare plans and estimates for the construction of a viaduct over the railroad tracks at High street.

Dayton, Or.—The contract for a steel bridge over the Yamhill River has been let to Hoffman & Bates, of Portland, for $14,000. The bridge has tubular piers 63 ft. high and a span about 340 ft. long.

Fairhaven, Wash.—The Detroit Bridge & Iron Co., of Detroit, has been awarded the contract for building a single-track iron drawbridge for the Fairhaven & Southern road over the Nooksack River, near Fairhaven. The bridge has a weight of 335,000 lbs. Four bids were received, the contract for the iron work being awarded at 4¼ cents a pound f. o. b., Chicago.

Franklin, Pa.—The county commissioners of Venango County, Pa., have awarded a contract to the Smith Bridge Co., of Toledo, for the erection of four single span iron bridges. The spans are 36 ft., 42 ft., 64 ft., and 57 ft. long.

Indianapolis, Ind.—The Louisville, New Albany & Chicago last week let the contract for six iron bridges to be placed on its road between Chicago and Indianapolis. The bridges will average over 200 ft. in length.

Lynchburg, Va.—The contract for the construction of the approaches to the Rivermont bridge has been let to W. H. Ford.

Marietta, Ga.—Bids will be received by J. M. Stone until July 28 for the construction of a bridge across Soap's Creek.

Minneapolis, Minn.—The County Commissioners have awarded the contract for the superstructure of the Cedar Avenue bridge across the Minnesota River to the South Bridge Co., of Toledo, O.

New York.—The House bill to incorporate the North River Bridge Co. and to authorize the construction of a bridge and approaches at New York City, across the Hudson River, has passed the Senate. This is the bridge proposed by Gustav Lindenthal, of Pittsburgh. The following are given as the incorporators of the company: Jordan L. Mott, John King, M. C. Lanahan, James Andrews, Thomas F. Ryan, Garret A. Hobart, F. W. Roebling, Charles J. Canda, Edward F. C. Young, Henry Flad, Gustav Lindenthal, A. G. Dickinson, John H. Miller, William K. Brookfield, Samuel Rea, William F. Shunk and Philip E. Chapin.

Norristown, Pa.—The County Commissioners of Montgomery County have awarded to John Denithorne & Son, of Phœnixville, Pa., the contract for the iron work of four county bridges, to cost $17,800. One of these bridges is over the Pennypack Creek, Abington township; another over the Aramingo, in Lower Merion, and the two others in the upper end of the county.

Ottawa, Ill.—It is proposed to erect a new bridge over the Fox River, in Ottawa.

Pine Bluff, Ark.—The Cable City Bridge Construction Co., of Independence, Mo., has completed a long pontoon bridge across the Arkansas River at Pine Bluff, Ark., for the Pine Bluff Bridge & Turnpike Co.

Plainfield, N. J.—A committee has been appointed by the Board of Freeholders to report upon the advisability of constructing two bridges in Plainfield, one over Cedar Brook and the other on Prospect Avenue.

Rye Neck, N. Y.—A new bridge will soon be constructed over the Mamaroneck River at Barry avenue.

Somerville, Mass.—A new iron bridge is being put in at Central street, Somerville, by the Boston & Maine, to replace the wooden one formerly at that point.

Stockton, Cal.—The people of this city have voted the sum of $25,000 for the construction of bridges.

Toledo, Wash.—The County Commissioners of Lewis County will recive bids until Aug. 18 for the construction of a combination bridge across the Cowlitz River, at Toledo, in Lewis County, on the county road between Toledo and Edonia. It will be a draw-bridge, with an opening of 75 ft. on each side. The bridge must be 18 ft. wide and about 350 ft. long, exclusive of approaches and the piers 36 ft. high above low water mark. The approaches are 100 and 200 ft. respectively. The bids must be accompanied by plans and specifications.

Towson, Md.—The County Commissioners have awarded the contract for building the iron bridge at Mt. Washington to the Wrought Iron Bridge Co., of Canton, Ohio, to whom the contractors for building four other iron bridges were recently awarded.

Valleyfield, P. Que.—The Quebec government has granted $510,000 towards the construction of an iron bridge at Valleyfield, Beauharnois County.

Wheeling, W. Va.—The work of replacing the false work for the channel span for the Union Railway bridge at Wheeling, which was carried away by flood last month, has been begun.

Work has been begun on the second of the Wheeling Bridge Co.'s bridges at Wheeling, and will be pushed to completion.

Pottsville Bridge Co.

This is a new company organized to carry on a bridge building business at the works of the Pottsville Iron & Steel Co. The President is Mr. William Atkins, Treasurer and Superintendent of the Pottsville Iron & Steel Co.; Vice-President and Engineer, Mr. H. L. Forte; Treasurer, Mr. John M. Callan, Secretary of the Pottsville Iron & Steel Co. The main office of the company will be 426 South Fourth Street, Philadelphia, and the works at Pottsville, Pa. The company is now ready to go into active competition for all classes of bridge work.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

A statute of Missouri of 1869 by its first section authorizes railroad companies whose lines connect with any company organized under the laws of an adjoining state to consolidate the stock, making one company of the two. Section 2 requires that the agreement be approved by the holders of a majority of the stock in each of the companies. Section 3 authorizes a new corporate name, and an exchange of the certificates of stock for stock in the new company, and requires a copy of the agreement and resolutions of consolidation to be filed with the state. Section 4 provides that the new company shall be subject to all the liabilities, and bound by all the obligations of the company within the state, and entitled to the same franchises and privileges. The Supreme Court decides that the former corporation was dissolved, when consolidation was effected under the act, and a new one was formed; and since the constitution of 1865, providing that no property should be exempt from taxation, with certain exceptions, not including that of railroad companies, took effect before the consolidation, the consolidated company could not avail itself within the state of an exemption granted by the charter of the former corporation before the constitutional provision was passed.[1]

An act of Congress of 1884 provides that the Federal courts of certain districts shall have jurisdiction, without reference to the amount in controversy, over all controversies arising between the S. K. Ry. Co. and the nations and tribes through whose territory the railroad of said company shall pass, or the inhabitants of such tribes and nations, and that the civil jurisdiction of said courts is extended within the limits of said Indian Territory so far as may be necessary to carry out the provisions of the act. The Federal Court holds that an inhabitant of a nation in the Indian Territory could maintain an action in a court designated in the act against the said railroad company for stock killed in such territory.[2]

In North Carolina the Supreme Court holds that under the provision of the code of the state, that railroads shall unite in forming connections, and, if they cannot agree, commissioners are to be appointed to determine the "points and manner" of making the same, one road cannot enter on the right of way of another for the mere purpose of connecting therewith, without previous agreement or condemnation proceedings, and a provision in its charter allowing entry on land for the purpose of "constructing" a road, and barring recovery after two years, would not apply. A parol permission to extend the track of one railroad upon the right of way of another, for the purpose of connecting therewith, is a mere license, revocable at the will of the licensor, though valuable improvements have been made.[3]

Carriage of Goods and Injury to Passengers.

In New York a railroad received goods for transportation, and gave a bill of lading, which stated that, after arriving at their destination, the goods should be held under the liability of a warehouseman, when they were placed in the storeroom, or were to be taken from the car by the consignee. They were kept in a freight-car for several days after reaching their destination, and were then destroyed by fire. Before the fire the owner's agent had been wrongly informed that they had been unloaded, at which he expressed regret, and requested the company to store the goods for a few days. The Court of Appeals holds that the company was not liable as a common carrier.[4]

In Texas the Supreme Court rules that a carrier cannot limit its liability for the full value of stock lost, through its negligence, by a contract to pay "the actual cash value at the time and place of shipment, but in no case to exceed $100 per head," in case of total loss of said stock.[5]

In Pennsylvania the Supreme Court rules that the right to build a railroad in the streets of a city is not dependent on the consent of the city, unless the company's charter expressly so provides, but a right of way may be acquired by condemnation proceeding under legislative enactment, as in other cases.[6]

Injuries to Passengers, Employes and Strangers.

In Massachusetts the Supreme Federal Court decides that where one accepts, as a gratuity, a free pass, an agreement to assume all risk of accident which may happen to him while traveling thereon, by which he may be injured in his person, is valid. One availing himself of such a ticket is estopped to deny that he made the agreement expressed therein because he did not and was not requested to sign it.[7]

In Pennsylvania the Supreme Court holds that a railroad company owes no duty of safe carriage to one who is on its train without its knowledge or consent, and in a place where its employés in the discharge of their

ordinary duties would not discover him, though it is the intention of such person to pay his fare.[8]

In Arkansas the Supreme Court holds that where trains habitually stop at a certain station, and an agent of the company sells a return ticket to that station to a person who has been informed of the custom, and relies on it, and the agent knows that the purchaser intends to use the ticket to return on a train which does not stop at that station, but does not inform him of the fact, the company is liable.[9]

In a case in New York the Supreme Court rules that the failure of plaintiff to pay her fare did not, of itself, relieve defendant of its duties to her as a passenger, since she may have intended to pay, and may have had no proper demand made upon her.[10]

In Iowa, in an action for personal injuries by jumping from a moving train, the plaintiff testified that he was standing on the rear platform of the car when the conductor took his ticket, and that afterward some one told him that the train would not stop at his destination, but that he must jump when the train slackened its speed, which he did. Both conductor and brakeman testified that they told plaintiff no such thing, and that the signal was given to stop the train, but plaintiff was found to have left the platform before the train was stopped. The Supreme Court holds that the evidence is not sufficient to show that it was with the knowledge or consent of either conductor or brakeman that plaintiff jumped from the moving train, and that he could not recover.[11]

In New York, in an action for injuries received by plaintiff, a passenger on defendant's train, by its collision with a light engine, it appeared that the engine had been left on a side track, two tracks away from the main track, on which the collision occurred, with its fire banked, and in charge of an employé, M., and while he was absent from it it was moved across the intervening track to the main track. There was no evidence as to who set it in motion, but it was conceded that M. did not. The Supreme Court rules that if the engine was maliciously started by one of its employés other than M. defendant was not liable, and that it was error to charge that it was liable if the act was done by an employé, though negligently or willfully, as such act would be outside of an employé's authority.[12]

In Oregon the Supreme Court rules that where a passenger was riding on a car with his elbow resting on the window-sill, and slightly projecting out of the window, but his hand and wrist were inside, and a stick of cordwood fell from the pile stacked near the track, through the open window at which he sat, striking in the palm of the hand, catching in the mouth of the coat sleeve and jammed the arm backward and injured it, the facts were not such as the court could decide to be negligence in law, but were for the jury.[13]

In Georgia it was the plaintiff's duty to go between the cars and make a coupling. Before going in he gave the proper signal to the engineer to stop, and the engine stopped when the cars were close together. The plaintiff went in there while the cars were stationary to adjust a pin or link with a view to make a coupling, and while thus employed the engineer caused the cars to come together without any notice to the plaintiff, and without his giving him any signal to do so. He received an injury, for which the Supreme Court holds the railroad liable.[14]

The Federal Court rules that trackmen are not fellow-servants of those in charge of trains.[15]

[1] State v. K. & W. R. Co., 12 S. W. Rep., 290.
[2] Briscoe v. South Kas. R. Co., 40 Fed. Rep., 273.
[3] R. & D. R. Co. v. D. & N. R. Co., 10 S. E. Rep., 629.
[4] Draper v. D. & H. Canal Co., 23 N. E. Rep., 131.
[5] South Pac. R. Co. v. Maddox, 12 S. Rep., 815.
[6] Appeal of Millvale, 18 Atl. Rep., 993.
[7] Quimby v. B. & M. R. Co., 23 N. E. Rep., 205.
[8] Bricker v. Caldwell, 18 Atl. Rep., 983.
[9] St. L., I. M. & S. R. Co. v. Adcox, 12 S. W. Rep., 874.
[10] Bartlett v. N. Y. & L. B. Trans. Co., (Supp)., 309.
[11] Herman v. C., M. & St. P. R. Co., 44 N. W. Rep., 298.
[12] Mars v. D. & H. Canal Co., 8 N. Y. Supp., 107.
[13] Moakler v. W. V. R. Co., 22 Pac. Rep., 948.
[14] Central R. Co. v. Lamer, 10 S. E. Rep., 279.
[15] Howard v. D. & H. Can. Co., 40 Fed. Rep., 195.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Canadian Pacific, 2½ per cent., payable Aug. 18.
Central of New Jersey, quarterly, 1½ per cent., payable Aug. 1.
Cheshire, 2½ per cent. on the preferred stock, payable July 15.
Cumberland Valley, quarterly, 2 per cent., payable July 1.
Louisville & Nashville, 3 per cent., payable Aug. 4.
Milwaukee, Lake Shore & Western, 3½ per cent. on the preferred stock, payable Aug. 15.
New York Central & Hudson River, quarterly, 1 per cent., payable July 15.
Northeastern (S. C.), 3 per cent., payable July 1.
Paterson & Hudson, 4 per cent., payable July 2.
Paterson & Ramapo, 4 per cent., payable July 2.
Wilmington, Columbia & Augusta, 3 per cent., payable July 10.
Wilmington & Weldon, 4 per cent., payable July 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Duluth, South Shore & Atlantic, annual, Marquette, Mich., July 17.
Grafton & Greenbrier, special, Philippi, W. Va., July 18.
Kentucky Union, annual, Louisville, Ky., July 21.
Marquette, Houghton & Ontonagon, annual, Marquette, Mich., July 17.
Marquette & Western, annual, Marquette, Mich., July 17.
Missouri Pacific, special, St. Louis, Mo., July 15.
St. Louis & San Francisco, special, St. Louis, July 21, to vote on the proposition of an increase of the common stock of the company.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Association of General Baggage Agents* will hold its next annual convention at Chicago, Ill., July 16.
The *Traveling Passenger Agents' Association* will hold its next annual convention at Buffalo, N. Y., August 19.
The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.
The National Association of General Passenger & Ticket Agents will hold its next semi-annual meeting at Denver, Col., Sept. 17.
The *American Society of Railroad Superintendents* will hold its annual meeting in New York City on the day preceeding the fall meeting of the General Time Convention.
The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.
The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m. The Club has adjourned until Tuesday, Sept. 16.
The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.
The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.
The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.
The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.
The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month. at the House of the Society, 127 East Twenty-third street, New York.
The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m. on the third Wednesday in each month. The next meeting will be held the third Wednesday in September.
The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.
The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.
The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia.
The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.
The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.
The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.
The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.
The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.
The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.
The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m., on the third Saturday in each month.
The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Convention of Accounting Officers.

The Association of American Railway Accounting Officers met at the Stockton Hotel, Cape May, July 9. Papers read were: "Railway Disbursements," by Stephen D. Little; "A Clearing House Plan of Freight Settlements," by J. S. Dennison, and "Safeguards for Collection of Revenue by Agents and Conductors," by W. H. Dudley.

Master Car Builders' Association.

The office of the Secretary of the Association has been moved from Buffalo, N. Y., to room 974 Rookery, Chicago.

The revised code of rules for the interchange of freight cars, as amended at Old Point Comfort, Va., which will take effect on Sept. 1, will be ready for distribution about July 25. The prices will be as heretofore, viz.: single copies, 5 cents; 25 copies, $1.00; 50 copies, $1.75; 100 copies, $3.00.

Orders for these rules, addressed to the Secretary, Mr. John W. Cloud, should give definite instructions if any extra printing is wanted on the outside, which will be charged extra at cost. The new code of rules for the interchange of passenger equipment cars, without any subscribing roads, will be printed as an appendix to the "Freight Car Code."

The American Boiler Makers' Association.

At the second day's sessions of the American Boiler Maker's Association, the committee on apprenticeship reported in favor of an apprenticeship system of at least four years, with two additional years to become a master workman. The report was not acted upon. The following men were re-elected officers for the coming year: President, James Lappan, Pittsburgh; Treasurer, R. Hammond, Buffalo; Vice-Presidents, Philip Rohan, St. Louis; Geo. Marshall, Dayton, O.; Christopher Cunningham, Brooklyn. John Mohr was elected a Vice-President in place of Mr. Marshall, resigned. Though opposed, it was decided to found an insurance company.

At the third days' sessions it was decided to form local boards in each place containing boiler factories, to have jurisdiction over all labor disputes, all decisions to be subject to the approval of the respective State Board of the association. It was decided to place the society's trade mark on its brand of steel. The new insurance company is to be controlled by the executive committee, with six additional members. The capital is to be $250,000, and the stock of each member is limited to 10 shares of $100 each. The next convention will be held in St. Louis, in May, 1891.

PERSONAL.

—Mr. H. H. Cloud, Chief Engineer of the Pecos Valley road, has resigned that position.

—Mr. John Page, Chief Engineer of Government Canals in Canada, died suddenly in his office in Ottawa last week.

—Mr. James Furber, Vice-President and General Manager of the Boston & Maine, has been made a Master of Arts by Dartmouth College.

—Mr. T. A. Frazer, Master Mechanic of the Minneapolis, St. Paul & Sault Ste. Marie, has resigned to accept the position of Superintendent of the Wells & French Car Co., of Chicago.

—Mr. James Isbister, the well-known railroad contractor of Ottawa, has, it is reported, accepted a position as Superintendent of Construction of the Winnipeg & Hudson Bay road.

—Mr. E. P. Wilson, recently General Passenger Agent of the Chicago & Northwestern, has been appointed Commissioner of the freight bureau of the Cincinnati Chamber of Commerce.

—Mr. F. G. Jewett, Manager of the Mahoning & Shenango Valley Car Service Association, has resigned to accept a similar position with the Central New York Car Service Association, with headquarters at Syracuse.

—Mr. John Hillhouse, Assistant Master Mechanic of the Wheeling & Lake Erie, died last week at Atlantic City, N. J., where he had gone for his health. He was formerly with the Michigan Central.

—Mr. Francis C. Yarnall, Vice-President of the Lehigh Coal & Navigation Co., whose death was referred to last week, had never held any official position with the Lehigh Valley road, as stated then, nor did Mr. E. W. Clark, referred to in the same notice.

—Mr. F. H. Phillips, Assistant Superintendent of the Mohawk division of the New York Central & Hudson River road, died at Little Falls, N. Y., this week. He entered the service of the company as a messenger boy, and was appointed Assistant Superintendent about ten years ago.

ELECTIONS AND APPOINTMENTS.

Albion & Corydon Branch.—The following directors and officers were elected at Corydon, Ind., July 2: M. J. O'Connor, St. John Boyle, Alexander H. Davis, John E. Green, Robert J. Tracewell, George W. Applegate and George K. Gwartney. President, M. J. O'Connor; Vice-President and Treasurer, St. John Boyle; Secretary, R. J. Tracewell.

Atchison, Topeka & Santa Fe.—This company having acquired the St. Louis & San Francisco the following agencies have been consolidated under the charge of the following agents: C. D. Simonson, General Eastern Agent, New York; S. W. Manning, General New England Agent, Boston, Mass.; T. M. Orr, General Agent, Pittsburgh, Pa.; E. S. Fishback, General Agent, Cincinnati, O.; C. Ivers, General Agent, St. Louis, Mo.; E. Copland, General Agent, Chicago; S. M. Osgood, General Agent, Des Moines, Ia.; J. B. Derby, Freight Agent, Philadelphia, Pa.; F. A. Jackson, Commercial Agent, Buffalo, N. Y.; A. Andrews, Freight Agent, Cleveland, O.; R. M. Bacheller, Commercial Agent, Detroit, Mich.; C. W. Stover, General Agent, Peoria, Ill.; W. T. Coulter, Commercial Agent, Quincy, Ill.; George M. Sergeant, Commercial Agent, Kansas City, Mo.; H. A. Russell, General Agent, St. Joseph, Mo.; H. L. King, General Agent, Atchison, Kan.; C. F. Zimmerman, General Agent, Denver, Colo.; C. M. Hicklin, Commercial Agent, Pueblo, Colo.; C. H. Morehouse, Division Freight Agent, El Paso, Tex.; C. R. Gray, District Freight Agent, Carthage, Mo.; E. H. Davis, District Freight Agent, Wichita, Kan.; C. O. Shepherd, Freight Agent, Milwaukee, Wis.; J. D. Kenworthy, Freight Agent, Salt Lake City, Utah.

Atlantic, Mexico & Pacific.—A. Dale Owen, of Philadelphia, is President, Henry Foliett, of London, is Vice-President, and Marshal Minker, of Detroit, is Secretary of this Ohio company referred to last week.

Boston & Maine.—The following order has been issued: William F. Simons, Superintendent of the Southern Division of the Lowell system, having resigned, Daniel W. Sanborn has been transferred to the position. The title "Lowell system," will hereafter be dispensed with, and the Boston & Lowell, Nashua & Lowell, Stony Brook, Central Massachusetts, and Manchester & Keene, with all other branches of the "Southern Division of the Lowell system," will hereafter be known as the "Southern Division of the Boston & Maine," under charge of D. W. Sanborn as Division Superintendent, with headquarters at Boston. Winslow T. Perkins has been appointed Division Superintendent of the Eastern Division, in place of Mr. Sanborn, transferred, with headquarters at Boston.

Carolina, Cumberland Gap & Chicago.—The following appointments have been recently made: C. M. Ward, General Manager; A. Tripp, Superintendent of Transportation; W. E. Stoney, Auditor; H. V. O'Rourke, Car Accountant.

Chattanooga Southeastern.—The incorporators are W. A. Robinson and E. H. Frazle, of Atlanta, Ga.; J. T. Robinson, of Athens, Ga., and E. R. Hulbert, of Chattanooga.

Chicago, Burlington & Quincy.—The following changes have been announced: C. G. Wilson, Superintendent of Freight terminals in Chicago, has been appointed Superintendent of the Iowa lines to succeed W. C. Brown, who succeeds W. F. Merrill as General Manager of the Hannibal & St. Joseph. Mr. Fred A. Delano, now assistant in the General Manager's office, succeeds Wilson as Superintendent of Freight Terminals.

Chicago, Milwaukee & St. Paul.—The following changes have been made: H. R. Williams, Assistant General Superintendent of the northern division. J. B. Cable, Superintendent of the Iowa and Minnesota division transferred to the Kansas City division. R. R. Minture, formerly Roadmaster in Sioux City, appointed Superintendent of the Iowa and Minnesota division.

Chicago, Rock Island & Pacific.—The following announcements have been made: Charles Dunlap, heretofore Assistant General Superintendent (lines west of the Missouri River) has been promoted to the position of General Superintendent (lines west of the Missouri River), headquarters at Topeka, Kan. The official title of W. K. McFarlin, heretofore assistant to General Manager, has been changed to Superintent of Maintenance and Construction, with office at Topeka, Kan. He will have general charge of roadway, bridges, buildings and construction work on lines west of the Missouri River. Mr. McFarland will report direct to the third vice-president.

Covington & Louisville.—At a meeting of the Directors, at Covington, Ky., July 3, Hon. J. H. McDanel, Gallatin County, was elected as President.

East Tennessee, Virginia & Georgia.—W. A. Vaughan has been appointed General Superintendent with head-

quarters at Knoxville, Tenn. The office of Superintendent of Transportation has been abolished.

Evansville & Terre Haute.—J. B. Sothern, Chief Train Dispatcher, has been promoted to Division Superintendent.

Galveston, Harrisburg & San Antonio.—At the annual meeting of the Company, the following directors were elected; C. P. Huntington, G. E. Gates, E. H. Pardee, Charles Babbidge, C. C. Gibbs, J. Kruttschmitt, W. G. Van Vleck.

Grand Rapids & Indiana.—F. S. Bowen has been appointed Assistant Road-Master of Southern Division, and will have immediate charge of all foremen and employés in that department. His headquarters will be at Kalamazoo, Mich.

Interstate.—The new board of directors consists of David Kelso, George W. Hawk, of Parsons, Kan; W. A. Johnson, of Garnett; S. H. H. Clark, George C. Smith, of St. Louis; Edwin Gould, of New York; David Murtin, of Atchison.

Jacksonville, Tampa & Key West.—Circulars have been issued abolishing the office of Assistant General Manager. Robert Gamble, Master of Transportation, will act for the present as Superintendent of the Jacksonville, Tampa & Key West.

Kentucky Union.—James K. Sroufe, of Maysville, Ky., has been appointed Engineer of Maintenance of Way of the road.

Little Rock & Memphis.—H. W. Morrison, formerly General Agent of the St. Louis, Arkansas & Texas road, at Memphis, has been appointed General Passenger and Ticket Agent of this line, with headquarters at Little Rock, Ark., to succeed S. W. Tucker, resigned.

Louisville & Nashville.—H. G. Barclay, who has been General Agent of the road in Mobile, Ala., for a number of years, has been promoted to the position of General Agent of the freight and passenger department of the company in that city.

Macon & Atlantic.—George W. Gustin has been elected President, and L. P. Hillyer, Secretary and Treasurer of this company, with offices at Macon, Ga.

Manhattan, Newton & Gulf.—The directors of the company have elected the following officers: President, A. L. Williams of Topeka; vice-presidents, S. R. Peters, of Newton, Kan.; S. M. Fox of Manhattan; secretary, John C. Johnston of Newton; treasurer, E. H. Hoag of Newton.

Mexican Pacific.—George Wilson, formerly General Manager of the Interoceanic, has been appointed to the same position with this company.

Mobile & Girard.—The annual meeting of the stockholders of the company was held July 13. The following board of directors was elected: N. P. Banks, President; W. H. Brannon, John Peabody, C. E. Hochstrasser, N. N. Curtis, C. H. Franklin, and J. D. Murfree. H. H. Warner resigned as Secretary and Treasurer, and P. E. Whittlesey was elected to fill the vacancy.

Norfolk & Western.—The position of General-Superintendent has been created and A. C. Hippey, Superintendent of the Altoona division of the Pennsylvania, has been selected to fill the position.

Northern Pacific.—The following appointments were recently made: H. E. Still appointed Division Freight Agent, with headquarters at St. Paul. He will have immediate charge of the local freight business on the lines east of the Missouri River, reporting to the General Freight Agent. R. A. Eva appointed Traveling Freight Agent for the territory east of the Missouri River, vice H. E. Still, promoted. He will report to the Division Freight Agent.

Angus Brown, Division Master Mechanic at Glendive, Mont., has been transferred to Livingston, Mont., to succeed James McNaughton, resigned to accept service elsewhere. George W. Gardiner, foreman at Missoula, Mont., has been promoted to the position of Division Master Mechanic, with headquarters at Glendive, Mont.

North Wisconsin & Lake Superior.—The incorporators of this Wisconsin company are: George Beyer, O. A. Ellis, W. P. Cook, W. H. Young, W. K. Smith, E. G. Murden and F. F. Wheeler, all of Oconto, Wis. The Menominee River, Oconto & Southern has been chartered by the same incorporators.

Oregon & Transcontinental.—The directors of the company have elected the following officers: President, Henry Villard; Vice-President, Colgate Hoyt; Second Vice-President, Paul Schultz; Secretary and Assistant Treasurer, T. H. Tyndale; Treasurer and Assistant Secretary, G. A. Eades.

Pacific Short Line.—L. S. Wakefield, of Sioux City, Ia., has been appointed to Chief Engineer, to succeed L. W. Clarke, resigned.

Portland & Puget Sound.—The company has elected the following officers: President, Charles F. Adams, Boston; Vice-Presidents, W. H. Holcomb, Omaha; D. P. Thompson, Portland; G. M. Lane, Boston; Secretary, W. W. Cotton, Portland; Assistant Secretary, Alexander Miller, Boston; Treasurer, James G. Harris, Boston; Local Treasurer, C. F. Holcomb, Portland.

Rio Grande Western.—A. E. Welby has been appointed Superintendent, with headquarters at Salt Lake City. The office of General Superintendent has been abolished. N. W. Sample has been appointed Consulting Superintendent of Machinery and Rolling Stock, with office at Denver.

St. Louis, Arkansas & Texas.—W. B. Groseclose, General Agent at Houston, Tex., has been appointed General Freight Agent of the line in Texas, with headquarters at Texarkana, vice R. H. Vaughn, resigned.

St. Louis & Hannibal.—F. C. Cake, General Auditor, having resigned, his duties will be attended to by W. W. Driggs, the General Passenger Agent.

San Francisco & North Pacific.—W. H. Menton has been appointed General Freight and Baggage Agent vice Charles Thorn, Jr., resigned, and W. J. McMullen, Assistant General Passenger and Freight Agent, vice W. H. Menton, promoted.

South Bound.—At the annual adjourned meeting of the stockholders held at Savannah, Ga., July 1, the following directors were elected: William S. Tison, B. A. Denmark, John L. Hammond, J. Florance Minis, and C. R. Woods, Savannah; Hon. Alfred Aldrich, Barnwell, S. C., and Col. John Lawton, Lawtonville, S. C. The directors met and elected the following officers: President, William S. Tison; Vice-President, B. A. Denmark; Treasurer, Herman Myers; Secretary, Marmaduke Hamilton.

Southern Pacific.—L. R. Fields, Trainmaster, has been appointed Acting Superintendent of the lines in Oregon, with headquarters at Portland.

South Fork.—Among the directors of this Pennsylvania road are: George F. Huff, Richard Coulter and T. Donohue, Greensburg, Pa.; John Lloyd, Altoona; Robert Pitcairn, Pittsburgh; W. A. Patton and James R. McClure, Philadelphia.

South Lake & Germantown.—The following are the officers and directors of the company: President, William Rogers; Vice-President, Hon. John Schwarz; Treasurer, Thomas Gadsden; Secretary, William Schroeter. The board of directors will be composed of the above officers, and T. F. Stubbs, F. D. Bloodworth, B. S. Wells, J. C. Shaw and Col. Peter Riley, of Savannah.

Tampa, Gulf & Northwestern.—Richard H. Marks, Chandler H. Smith, Peplo Forwood, W. S. Jordan, E. E. West, of Madison, W. F. Penniman, of Brunswick, Ga.; A. R. Wright, of Thomasville, Ga.; F. M. Farley, of Savannah, Ga.; Joseph S. Lawrence, of Washington, D. C., and Edward Lewis, vice-president of the First National Bank of Tallahassee, Fla., are the incorporators of this Florida road.

Union Pacific.—Fred Wilde, Jr., has been appointed General Freight Agent of the Union Pacific, Denver & Gulf. H. W. Adams has been appointed Assistant General Freight Agent of the same system, succeeding Mr. Wilde. E. B. Mays, General Agent of the Union Pacific at Butte, Mon., vice Mr. Adams. Herman Arnaldt has been appointed General Yardmaster at Denver, vice R. Burns, resigned. Richmond Anderson has been appointed Auditor of Disbursements, vice J. W. Griffith, promoted.

RAILROAD CONSTRUCTON.
Incorporations, Surveys, Etc.

Alabama, Georgia & Florida.—The preliminary survey for this road is now in progress, and reached Lumpkin, Ga., 100 miles north of Quincy, Fla., last week. The route from Bainbridge through Cuthbert to Lumpkin, follows the old survey of the Bainbridge, Cuthbert & Columbus. It is understood that the company has secured the title for the abandoned grade of that road between Bainbridge and Cuthbert, about 60 miles. The engineers are now surveying from Lumpkin toward the Chattahoochee River, a few miles above Jernigan, Ala., and thence toward Birmingham, which is about 155 miles from Lumpkin. The total length of the main line between Quincy and Birmingham, through Columbus, will be about 310 miles. Of this, 50 miles will be heavy and 150 miles medium work. The remaining 110 miles will be light work.

Albany & Cordele.—King & Hannon, of Montgomery, Ala., are reported to have the contract for the grading on this road, and A. R. Coulter & Co., of Americus, Ga., for the bridges and trestles, and R. M. Stewart & Co. for the cross ties. The locating survey is now in progress under W. W. Campbell.

Atchison, Topeka & Santa Fe.—The President of this company is reported to have written, in response to a letter from the Board of Trade of Wichita, Kan., that he contemplated an early extension of the Kingman, Pratt & Western from its present terminus near Mullinsville, Kan., westerly about 30 miles to Wichita.

Birmingham, Sheffield & Tennessee River.—A survey was recently commenced for a proposed line from Margerum, on the Tennessee River, southerly to Russellville, on the main line of the road.

Calgary & Edmonton.—Geo. H. Strevel, has received the contract for grading 100 miles of this road from Calgary, Alberta. Work has been commenced at Calgary with 200 men. The surveyors have reached a point 15 miles north of Lone Pines. They are entering a region of bush and timber, where their progress will be less rapid than they have been making. The surveyors on the southern line to the boundary are at Bow Liver, between Sheep and Pine creeks.

Camden & Alexandria.—The contracts will be let within the next fifteen days for the grading of the first 31 miles of the extension from Camden, Ark., to Alexandria, La. The total distance is about 100 miles. The first 31 miles to El Dorado have been located. The maximum grade on this section is about one per cent. and the maximum curvature is four degrees. The work is not very heavy, averaging about 15,000 cu. yds. per mile. It is expected to have trains running through to El Dorado in the fall.

Canadian Pacific.—On the branch from Sproats Landing to Nelson, B. C., 28 miles, Whitehead, McLean & McKay, who have the contract for grading the first 14 miles have made fair progress. They have 400 men and a number of teams on the first five miles of the work, which takes them around the rocky bluffs at the mouth of the Kootenay. This section of five miles is to be completed by July 15. The remainder of the 14 miles is easy work. John McLeod is Superintendent of Construction for the company.

Charleston, Cincinnati & Chicago.—An arrangement has been made with the contractors by which they are to put a much larger force on the uncompleted portion of the grading and tracklaying between Johnson City, Tenn., and Minneapolis, Va., about 70 miles. The grading has been completed for most of this distance, and the tracklaying will probably be completed in the latter part of August. William Kenefreck has the contract from Johnson City to the North Carolina State line.

Charleston, Sumter & Northern.—The contract for the grading between Sumter and Bennettville, S. C., a distance of 63 miles has been sublet to R. S. Pringle & Co. The Phœnix Bridge has the contract for the bridge over the Pee Dee River and Willima & Touly for the trestling over the Pee Dee swamp. The grading will be light most of the distance, the heaviest work being a piece in the Santee bottoms four miles long and 12 ft. deep.

Chattanooga Southeastern.—This company has applied for a charter in Georgia to build a road from Athens to Chattanooga, through the counties of Clarke, Jackson, Hall, Gwinnett, Foryth, Dawson, Cherokee, Pickens, Gilmer, Gordon, Murry, Whitfield, Catoosa and Walker in Georgia. The length of the road in Georgia, from Athens to the state line in Walker County, will be about 150 miles. The capital stock is $1,000,000.

Chattanooga Southern.—T. B. Redmond will sublet immediately at La Fayette, Walker County, Ga., his 30-mile contract on this road. W. C. Durand, of Chattanooga, has also about 40 miles in Alabama which he will sublet.

Chicago & St. Louis.—Articles of incorporation were filed this week in Illinois by this company, principal office at Chicago, to construct a line from Chicago in a southwesterly direction to East St. Louis, Ill. The capital stock is $3,000,000. The incorporators are: W. S. Hinkley, Hinsdale, Ill.; F. E. Hinkley, E. M. Green, John J. McClellan and Benjamin F. Cummings, of Chicago.

Chicago & West Michigan.—The extension from Grand Rapids north to Traverse City, Mich., a distance of about 150 miles, was placed in operation July 6.

Choctaw Coal & Railway Co.—Most of the grading is reported completed between South McAlester on the Missouri, Kansas & Texas, and El Reno, Ind. Ter., on the Chicago, Rock Island & Pacific. A large amount of ties and rails have arrived at El Reno and it is stated that tracklaying will be soon begun on this division.

Cleveland, Cincinnati, Chicago & St Louis.—The company gives notice that, in pursuance of the action taken by the stockholders at Cincinnati July 7, in ratifying the six propositions submitted to them, the transfer books of the common stock of the company will close on July 21, when common stockholders will be entitled to subscribe for the new common stock at $70 per share, in the ratio of one full share for each six and two-thirds shares registered by them, this proposition being equal to 15 per cent. of their present holdings, providing their subscription for such new stock be made on or before July 31, after which date the right to subscribe will be forfeited.

Coudersport & Port Allegany.—The contract for the tracklaying on the five-mile extension of the road has been let to Grattan & Jennings, of Buffalo, who did the grading.

Denver & Rio Grande.—Several miles of track have been laid on the Florence branch, which will have a total length of about 4½ miles. It is being built from Florence, Col., near Canon City, to mines. Much of the bridgework has been completed, and the line will be ready for operation in a week or two.

A branch about two miles long will probably be built from a point on the present line between Florence and Coal Creek to coal mines at Williamsburg.

It is stated that the company will soon begin surveys for a new line to Silver Cliff, Col., along Oak Creek, and also from a point near Cañon City up Texas Creek. The present line to Silver Cliff has been washed away a number of times. It was seriously damaged last winter, and has not since been operated.

Denver, Texas & Fort Worth.—The tracklaying on the extension from Martinsen, Col., along the Red River, has been completed for about nine miles. The entire extension will be 13 or 15 miles long. About 95 teams and 150 men are now working on the line. The maximum grade is 3½ per cent. and the maximum curvature 16 degrees. There is a large amount of heavy rock work on the line. J. R. De Remer, of Denver, has the contract.

Duluth & Iron Range.—It is reported that the road will build a branch from Tower, Minn., to iron properties in sections 10, 9 and 8, township 62, range 14.

Findlay, Fort Wayne & Western.—At Toledo, Ohio, on July 1, before Judge Ricks, of the United States Circuit Court for the Northern District of Ohio, the sale of the New York, Mahoning & Western, which was made to W. C. Dornin, of New York, on June 2, was confirmed. It is the purpose of those who are interested to complete the road under the title of the Findlay, Fort Wayne & Western Railroad Co. before Jan. 1 to Fort Wayne, Ind.

Fort Worth & Rio Grande.—The grading of the section between Dublin and Comanche, Tex., about 22 miles, has been nearly all completed with the exception of a short piece near Comanche. It is expected that the tracklaying will be completed early in August. Several surveys have been made for a further extension from Comanche, but the company has not yet decided which survey to adopt. Lines have been run to Brownwood, Brady, San Saba and Llano. The first three of these lines pass through a very fertile section, and the latter line will reach important iron mines in Llano County.

French Broad Valley.—The contract will soon be awarded for grading an additional 17 miles of this road in North Carolina. At present contracts have been sublet for the grading of about 40 miles of the line. A. B. Fortune has the grading on 12 miles; J. D. Harden the grading on 14 miles; W. C. Corpening & Co. the grading and masonry on 14 miles. This firm may also secure the 17 miles referred to above. H. M. Smith has the masonry on 80 miles.

Georgetown & Charlotte.—Books have been opened at Charlotte, N. C., for subscription to the capital stock of the company, which has been organized to construct a road to Georgetown, S. C. R. P. Waring, Rufus Barringer, T. L. Vail and others are interested.

Georgia, Carolina & Northern.—The iron bridges over the Enoree and Tiger Rivers in South Carolina have been completed. The tracklaying has been finished to the Enoree River a distance of 73 miles from Monroe, N. C., and it is expected that the track will be laid to Clinton, 17 miles beyond the Enoree River by Aug. 1. It is expected to have the line in operation to Greenwood, S. C., a distance of 108 miles from Monroe, early in September. All the grading in South Carolina has been finished and for some distance in Georgia beyond the Savannah River.

Georgia Pacific.—The contract for building a second track on the line between Atlanta and Peyton, Ga., seven miles, has been awarded to Birmingham contractors. The company proposes to double track other portions of its line in Georgia and Alabama.

Great Northern.—The control of the Fairhaven & Southern has been secured by the Great Northern by a purchase of the majority of the stock, and that company will complete the line from its present terminus south to Seattle, a distance of about 75 miles. It is stated that this section will be completed during the present year. One of the parties of engineers who are surveying the Pacific coast extension of the road, have, it is stated, found a suitable pass through the main range of the mountains where the grade is but one per cent.

Gulf, Brazos Valley & Pacific.—The engineers making the preliminary survey for the division between Henrietta and Mineral Wells, Tex., have completed the line for a distance of about 30 miles south of Henrietta. The company states that grading will begin at the latter point as soon as the locating survey for this section has been completed.

Hocking & Western.—The contract will probably be let this month for constructing this road from Chauncey through Floodwood to London, O., a distance of about 90 miles. The company at present has a force of about 200 men at work on a tunnel through a hill at Floodwood. W. H. Jennings, of Circleville, is Chief Engineer.

Houston, Central Arkansas & Northern.—The Missouri Pacific began operating this road on July 1 from McGehee, Ark., on the St. Louis, Iron Mountain & Southern south to Riverside, La., a distance of about 118 miles. The line passes through the towns of Dermott, Hudspeth, Merrell, Portland, Poplar Bluff and Kemp's Lake in Arkansas, and the following towns in Louisiana: Bonne Ide, De Gallion, Mer Rouge, Halls, Kellars, Doss Boeuf, Spring Hill, Fouche, Monroe, Charleston, Logtown, Bosco Belle, Eureka and Riverside.

Henry, Forrest & Co., Room 54, Gay Building, St. Louis, Mo., and Columbia, La., have the contract for the extension between Riverside and Alexandria, La., on the Texas & Pacific, a distance of about 60 miles. The firm will sublet the work at once. Their contract embraces work in the western part of Louisiana along the Ouachita River for a part of the distance and through a high and dry rolling pine country. The soil is a sandy loam and the clearing will be light. The work to be sublet includes 3,000,000 cu. yds. of earthwork, 2,500,000 ft. B. M. timber work, 150,000 lineal ft. piling, 250,000 cross ties, 1,500 acres clearings.

Kickapoo Valley & Northern.—Construction has begun on this road in Wisconsin, which is to extend from Wauseka, Crawford County, to Wilton, Monroe County, about 80 miles. It will open up a hard wood timber region and agricultural section. It will connect with the Chicago & Northwestern at Wilton, and with the Chicago, Milwaukee & St. Paul at Wauseka. E. I. Kidd, of Prairie du Chien, Wis., is President.

Leavenworth & St. Joseph.—It is stated that the right of way has been secured for this extension of the Chicago, St. Paul & Kansas City, between St. Joseph and Beverley, Mo., opposite Leavenworth. The bridge of the Chicago, Rock Island & Pacific across the Missouri river at this point will be used. The line will leave the St. Joseph, St. Louis & Council Bluffs about four miles east of St. Joseph, extending south through Dearborn and New Market to Beverley Junction.

Lehigh Valley.—B. P. Smith, of Rochester, has finished a contract for the building of eight miles of line on the Ithaca & Auburn branch of the road.

Louisville & Nashville.—The second track between Graces and Oxmoor, Ala., about three miles, was placed in operation last week. A double track has been recently built on about 12 miles of the Alabama lines, near Birmingham, north to Boyles, five miles, and south to Graces, four miles, and Oxmoor, three miles.

Macon & Atlantic.—The Macon & Dublin, which owns a partly graded road between Macon and Dublin, Ga., has secured an injunction against this company to compel it to discontinue work on the road between Macon and the Atlantic coast, upon which work is now in progress. The original injunction has been modified, so that the company is allowed to continue the grading until the case is heard on July 25.

Manistee & Northeastern.—The company has placed in operation an extension from Nessen City to Interlochen, Mich., a distance of about 9½ miles.

Memphis, Little Rock & Indian Territory.—One of the latest actions of the promotors of this scheme has been to file for record in Arkansas a mortgage for $1,200,000 in favor of the Holland Trust Co., of New York.

Menominee River, Oconto & Southern.—This company was organized last week in connection with the North Wisconsin & Lake Superior to build a line 65 miles long from Marinette to a junction with the latter road at Seymour, Wis. The capital stock is $75,000 and the incorporators are the same as those of the North Wisconsin & Lake Superior road.

Mexican Roads.—A concession has been granted to Gen. Juan Bautista Caamaño to build a standard gauge line from the City of Mexico to the port of Zihuatanejo, on the Pacific coast, in Guerrero, passing through Toluca, Temascaltepec, Cutzamalá, Coyuca and Cuahuayutla.

A concession for a road, either standard or narrow gauge from La Ermita de Teapa, in the State of Tabasco, to Ixguatan, in the state of Chiapas, has been granted to Magin Llaven. The concession carries no subvention. Surveys must begin at once.

The concession granted in October, 1889, to Francisco Alfaro for a road from Mazatlan to Camargo, on the Rio Grande, is now in the possession of Albert K. Owen. This concession has been modified, and the route is now as follows: From Topolobampo Bay to Presidio de Rio Grande, branches not longer than 50 kilometers may be built. The subvention is payable in six per cent. bonds. At the expiration of 99 years the line reverts to the government, which, however, must pay cash for the rolling stock.

A concession has been granted by the Department of Public Works to J. E. Valenzuela for the construction of a road from a point on the Mexican International between Piedras Negras and Nava to the coal fields of the Carboniferous Company, of Piedras Negras, with the right to extend the road to Zaragoza, in the state of Coahuila.

Mississippi Central Valley.—This company has been organized at Rosedale, Miss., to build a road from Rosedale eastward to Bogue Phalia, 6½ miles, and thence to the main line of the Louisville, New Orleans & Texas, terminating at a point on the Illinois Central, probably at Grenada. The section to Bogue Phalia it is proposed to complete at once. Charles Scott is President, and John T. Kuhn Vice-President and General Manager of the company.

Mont omery, Pensacola & Mobile.—This company has been incorporated in Alabama, by J. C. Woolfolk, W. F. Joseph and others, to build a road from Luverne, the terminus of one branch of the Alabama Midland in the direction of Mobile and Pensacola.

Morristown & Cumberland Gap.—Grading was commenced near Morristown, Tenn., on June 25. The road is to be built between Morristown and Luttrells, a distance of 40 miles in ten months. At the latter point it will connect with the Knoxville, Cumberland Gap & Louisville, using the track of that road to Cumberland Gap, about 40 miles.

New Albany Belt & Terminal.—D. J. Conger, New Albany, Ind., has been awarded the contract of the grading on the road, and will begin work at once.

Newark Bay.—The articles of incorporation of the company have been filed in New Jersey. The road will be two miles long, and will extend from Murray street and T avenue to the Morris Canal and Frederick street, in Newark. It will give the Lehigh Valley road a direct line from Communipaw into the heart of Newark. The canal is the property of the Lehigh Valley road.

New Roads.—Grading has been commenced on a line about ten miles long between Newport and Santa Ana, Cal. The road commences at the property of the Newport Lumber Co., near Newport. A bridge is being built over the Santa Ana River. The rails have been shipped, and it is expected that tracklaying will be commenced in about three weeks. The location of the terminus in Santa Ana has not yet been decided upon.

B. D. McDougall, of Lakeport, Cal., is interested in a proposed road from that point to Ukiah, Cal., on the San Francisco & North Pacific Coast road. The survey was made some time ago. It is estimated that it will cost $720,000.

The survey for the proposed road between Huntsville and La Grange, Tex., has been completed from the former town to Navasota, a distance of about 42 miles. A new survey is now being made between these points, passing through Anderson. A. Wells, of Tyler, Tex., is Chief Engineer.

A. P. Chamberlain, E. J. Sanford, R. N. Hood, E. L. Sanford and W. M. Bradford have filed an application in Tennessee for a charter for the road referred to recently which is projected from Lenoirs to a point near Keathly.

Northern Mississippi.—The company has been organized in Minneapolis to build a branch line of the Great Northern in Cass County, Minn., penetrating the iron and lumber regions of northern Minnesota. The capital stock is $10,000, and the incorporators are John B. Atwater, Charles H. Babcock, Samuel Hill, Anson B. Jackson and John McGuire, all of Minneapolis.

Northern Pacific.—Donald, Smith & Howell, of North Yakima, Wash., have the contract for building the branch from Whalen, on the Spokane, & Palouse to Lewiston, Idaho, and they now have 500 men at work. This force, it is believed, will soon be increased to 2,000. The contractors have made their headquarters at Moscow, eight miles from Whalen.

Northern Pacific & Manitoba.—The company will probably begin at once the construction of a branch from Kootenay on the main line to Banner's Ferry on the Kootenay river, where steamers will connect with all points on the lake. This movement has probably been hastened by the fact that the Great Northern road has surveyed a preliminary line through the Kootenay country.

North Wisconsin & Lake Superior.—This company was organized at Madison, Wis., last week with a capital stock of $2,500,000, for the purpose of building a road from Oshkosh, Wis., to Keweenaw Bay, Mich., the line being 200 miles long and passing through the counties of Winnebago, Outagamie, Oconto, Marinette and Florence.

Parry Sound.—It has already been noted that the contract for the construction of this road has been awarded to W. G. Reid, of Montreal. It is intended to complete ten miles of road this season and the remaining 37 miles during 1891. The proposed line will run in an easterly direction from Parry Sound, to near Emsdale, Ont., on the Grand Trunk, a distance of 47 miles. The company has a subsidy from the Ontario government of $3,000 per mile and a grant of $3,200 per mile from the Dominion Government.

Pennsylvania Mutual.—This company was incorporated in Pennsylvania last week to construct a road through Munroe and Lackawanna counties, a distance of 50 miles. The line will start at the Delaware River, near Stroudsburg, and extend to the Lackawanna River, near Scranton. The capital stock of the company is placed at $3,000,000.

Philadelphia & Sea Shore.—There has been some delay in the construction of the road to Sea Isle City, N. J., caused by a failure to receive ties brought by water, but they have now arrived and the contractors think they can have the road constructed to Sea Isle by July 15. All the bridges, except a small one, have been completed, the road has been graded and only a few miles of rail remain to be laid.

Port Arthur, Duluth & Western.—It is stated that the grading has been resumed near the present terminus, and that it is proposed to complete the line to the Minnesota boundary this year.

Qu'Appelle, Long Lake & Saskatchewan.—Trains are now running on the section between Regina and Saskatoon. The grading has been completed on the greater part of the distance between the latter point and Prince Albert, and construction trains will probably be running the latter part of December.

Raritan River.—The company has secured permission to build its track across the highway between Bound Brook and New Brunswick, N. J. The line between these points, about seven miles, will now be completed very soon, and the entire road along the Raritan River from Sayerville Junction to Bound Brook will then be opened for traffic.

Ravenswood, Spencer & Glenville.—Special meeting of the stockholders will be held at Ravenswood, W. Va., July 15 and 16, to vote on the proposed increase of the capital stock and to authorize a first-mortgage to secure an issue of bonds to the amount of $400,000. The line is being built as an extension of the Ohio River road, and the contrct for grading has been let to Stanley & Oulds, as already noted.

Rio Grande Western.—H. T. Reynolds & Co., of Springfield, Utah, who have the contract for the Thistle extension of this road, have a large force working on the 32 miles between Thistle and Fairview, Utah. The heaviest grading on the extension is on this section. Tracklaying will be commenced very shortly. The old cross ties and rails taken up from the main line when it was changed to standard gauge will be used, as will also the old narrow gauge equipment. The southern terminus of the extension will be near Marysville, about 150 miles south of Thistle. If the proposed narrow gauge line to the Tintic mines is built the Thistle extension will probably not be continued to Marysville, as the line parallels the Union Pacific for nearly the entire distance. The Tintic extension will also parallel the Union Pacific, and that company is opposing the construction of both lines.

St. Catharines & Niagara Central.—The capital stock of this company has been increased to $1,600,000. The president is quoted as saying that the settlement of some details is all that delays the commencement of workon the extension to Toronto.

Saskatchewan Railway & Mining Co.—Notice is given that application will be made to the Dominion parliament at its next session for an amendment to the act incorporating the company, providing for an extension of its line southward from Dunmore to the American boundary, in either range 8, 9 or 10 west of the 40th meridian; also a branch from Saskatoon in a northerly direction, crossing the north Saskatchewan River to Green Lake, thence to Beaver River, and northward to Water Hen Lake.

Shelby Iron Works.—The Louisville & Nashville has purchased the railroad owned by this company. The price has not been given out. The road is 13 miles long and extends from Columbiana on the East Tennessee, Virginia & Georgia to Shelby, Ala., and thence southward toward the Coosa River. The rolling stock was included in the sale. The road will form a link in the extension of the Anniston & Atlantic from Sylacauga to Calera. Work on the extension is under way from both ends, and the bridge over the Coosa River is being erected.

Silver Springs, Ocala & Gulf.—The company will probably soon resume grading on the extension from near Dunnellon south through Mannfield to a point in the southern part of Citrus County, Col.

Sinnemahoning Valley.—W. S. Grattan & Co., of Buffalo, have been awarded a contract to build a cut-off of this road about three miles long. Some of the work will be very heavy and will include several large cuts.

Southern Pacific.—Turton & Knox, of Sacramento, Cal., have the contract for the extension of the Stockton division from Oakdale to Merced, a distance of 40 miles. The maximum grade is one per cent. and maximum curves are five degrees.

South Atlantic & Northwestern.—It is stated that arrangements have been made to complete this road and that the bonds have been placed in England. Construction work will probably be commenced in September. The road is to extend from Southport, through Salisbury and Mocksville, to Charlotte, N. C.

South Fork.—A charter has been granted to this company in Pennsylvania to build a road from a point on the Pennsylvania near South Fork, Cambria County, by way of the valley of the South Fork of the Conemaugh River, to the dividing line between the counties of Cambria and Bedford. It will be 14 miles long. The capital stock is $210,000. Robert Pitcairn, Pittsburgh, and James R. McClure, Philadelphia, are directors.

South Lake & Germantown.—This company has been recently organized in Charleston, S. C., to build a road from a point in Charleston at Montgomery and Twelfth streets to Rosedew, on the Little Ogeechee River, and thence to a point on the Vernon River, probably at Montgomery, a distance of about 12 miles. The line is projected by the DeSoto Investment Co. It will be built principally for passenger traffic, but a considerable freight traffic in market produce is also expected. The motive power will be either steam or electricity.

South Side Rapid Transit.—It is stated that this road has concluded a negotiation by which its line is to be extended to South Chicago, the last four miles as a surface road. It is understood that the Baltimore & Ohio refused to sell its right of way, and instead took an interest in the elevated road, with its proposed extension under lease as a surface road from the Illinois Central line to South Chicago. The proposed line passes just south of Jackson Park, where the World's Fair is to be held.

Stone Mountain Railroad & Quarry Co.—This company proposes to soon begin the construction of a short road from a point near Longmont, Col., to a connection with the Colorado division of the Burlington & Missouri River road near Tower. When the line is completed it will probably be operated by the Burlington & Missouri River.

Tacoma, Olympia & Gray's Harbor.—Griggs & Heustis will sub-let contracts for clearing and grading on this road at once, at their Tacoma and Centralia offices.

Tacoma, Orting & Southeastern.—The company proposes to build a branch line into Kapousin township, on the Puyallup River, about eight miles south of Orting, Wash.

Tacoma & Puyallup.—This road extends from Ninth and Railroad streets in Tacoma, Wash., south to Adams street, to C street, to Delin street, to section 16 near the western limit of the northwest quarter, to South Thirty-ninth and I streets, south to the town of Fern Hill, the township line, east to the middle of the northeast quarter of section 3, Twp. 19 N. R. 3 East, south to the town of Midland in the southeast quarter of section 3, east 3¼ miles along the middle line of sections 3, 2, 1 and 6, northeast through section 5, 32 and 33 and east through section 28 to the corner of Meridian street and Indiana avenue in the town of Puyallup. The total length is 15 miles. The last spike was driven on June 29. The road is now completed with the exception of less than a mile on Railroad street, which will be finished in two weeks. The work was done under the supervision of Mr. Owen Woods. In general the grades are light. The grade at Tacoma is to be reduced to 3 1-3 per cent. There are some curves of 150 ft. radius.

Tampa, Gulf & Northwestern.—This road has been recently chartered in Florida. The capital stock is $4,500,000. The road is to extend from a point on the Florida and Georgia state line southwest of River Junction, in Jackson County, and easterly and southerly through Jackson, Gadsden, Liberty, Leon, Wakulla, Jefferson, Taylor, Lafayette, Levy, Marion, Citrus, Hernando, Pasco, Hillsboro, and Manatee Counties, to Charlotte Harbor, in DeSoto County, with a branch to Ocala in Marion County. The total length of the road including branch will be 450 miles.

Temiscouata.—The St. Francis branch is being rapidly pushed. The bridge at Edmundston, N. B., is nearing completion. The piers are solid stone masonry. The superstructure is not in position yet. The contractors, Malcolm & Ross, expect to have trains running over a portion of the road before fall.

Texas Trunk.—It is stated than Franklin & Mitchell, of Dallas, Tex., have been awarded the contract for building 12 miles of an extension of this line from Kaufman, through the Gregory coal mines, in Henderson County, to Athens, Tex., a distance of about 24 miles. The contract includes the first six miles south of Kaufman and six miles north of Athens. The survey has reached Athens, and it is expected that grading will be

gin as soon as it has been finished. It is reported that the Texas Trunk and the Dallas, Pacific & Southeastern have been merged in a new company. The latter line completed the grading on about 72 miles from Dallas northwest last year, but the tracklaying was never commenced.

Toledo & Chicago Air Line.—Part of the bonds of this company are said to have been negotiated with New York bankers, who have also subscribed for a large part of the Construction Company's capital stock.

Union Pacific.—The grading on the extension from Milford, Utah, has been finished for 100 miles to within ten miles of Pioche, and for 30 miles from Milford all the culvert and trestle work is completed. While there are only 12 miles of rails on hand, more are now being shipped and from five stations 20,000 ties are being loaded. The contractors are trying to engage 500 additional men to work on the extension.

Wheeling & Lake Erie.—The Board of County Commissioners of Ohio County, W. Va., considered this week the proposition made to submit to the voters of the county a loan for $100,000 in aid of the company, payable when it runs its cars into the city over the Union railroad bridge, and refused to submit the loan by a vote of 7 to 3.

Wichita Valley.—The grading has been completed from Dundee, the present end of track, south to the southern terminus at Seymour, Tex., a distance of 28 miles. The tracklaying on this section has been delayed by the non-arrival of material, but sufficient rails have now been received to complete the road.

GENERAL RAILROAD NEWS.

Alabama Midland.—The stockholders of the company, at a meeting in Troy, Ala., July 8, authorized the sale of the road to the Savannah, Florida & Western. The road extends from Montgomery to Bainbridge, 173 miles, and has just been opened for traffic. The connection with the Savannah, Florida & Western is at Bainbridge.

Baltimore & Eastern Shore.—A consolidation has been effected by this company of all the roads extending from Annapolis to Ocean City, Ind. The roads are the Bay Ridge & Annapolis, five miles long, extending from Annapolis to Bay Ridge; the one-mile road, with terminals at Bay Ridge and Claiborne, on the east side of the bay; the Baltimore & Eastern Shore road, 57 miles long, extending from Claiborne to Salisbury, and the Wicomico & Pocomoke road, with terminals at Salisbury, 31 miles long, extending from Salisbury to Ocean City. The total length of the consolidated roads is 108 miles, including the bay crossing. The Chesapeake Terminal Co. owned the terminals in Anne Arundel County at Thomas Point, in Talbot County, on the Bay Shore, and the transfer steamer "Thames River." The Baltimore & Ohio owned the Bay Ridge road. The property has been mortgaged to secure the issue of $1,600,000 five per cent. bonds, payable in 30 years. The owners of the Bay Ridge road, the Chesapeake Terminal Co. and the Wicomico & Pocomoke will receive bonds in payment for their respective properties; $200,000 of the bonds are set aside for future settlements, $200,000 for the repair of the Wicomico & Pocomoke. The Baltimore & Ohio receives about $150,000 of the bonds for the Bay Ridge road and its Chesapeake Terminal property, and about $220,000 of the bonds go to the owners of the Wicomico & Pocomoke road. The Baltimore & Eastern Shore will be in running order from Claiborne to Salisbury on July 20, and through trains can then be run from Baltimore to Ocean City. The Eastern Shore Road is now completed to Vienna on the Nanticoke river, and the first train will be run to that point in a few days. The bridge across the Nanticoke is not yet complete. In its construction 3,200ft. of piling have been used, and its cost will be about $37,000. The bridge over the Choptank cost $42,000, and in building it 3,795 ft. of piling were used. The construction train has been transferred to Salisbury, by way of Seaford, and the laying of track will proceed westward toward Nanticoke. By the time Nanticoke is reached it is expected that the bridge over that stream will have been finished. The road will be equipped with five engines, 24 passenger cars, 50 box cars and 30 gondola cars.

Canadian Pacific.—The gross earnings for the month of May, 1890, were $1,319,423, and the operating expenses $854,721, leaving a net profit of $464,702, against a net profit of $380,599 for the same month last year. The gross earnings for five months ending May 31 were $5,555,316, and operating expenses, $3,968,291, leaving the net profits $1,587,025, against net profits of $1,449,960 for same period last year.

Charleston & Gauley.—The stockholders formally confirmed the action of the directors in selling the road to the Kanawha & Michigan at a meeting held at Charleston, W. Va., July 5. The road was built last year along the Gauley River, in West Virginia, as a branch of the Kanawha & Ohio, now the Kanawha & Michigan.

Cincinnati, Jackson & Mackinaw.—A sufficient amount of the securities of the company having been deposited with the Central Trust Co. of New York, in accordance with the plan of reorganization, the committee has declared the plan effective, and six months having elapsed since the default, the Central Trust Co., as trustee, has been requested to proceed with the foreclosure.

Colorado Midland.—This company has made an arrangement to run its trains into Denver over the tracks of the Denver & Rio Grande from Colorado Springs. It has heretofore run its trains between these points over the tracks of the Atchison, Topeka & Santa Fe, with which it had a trackage agreement.

Evansville & Terre Haute.—The stockholders of the road will, at a meeting in October, vote on a proposition to issue $3,000,000 of new stock to take the place of the securities now held in its treasury, and to represent money spent in improvements and betterments.

Gainesville & Dahlonega.—This road was sold at Gainesville, Ga., July 2, by the receiver, W. A. Charters, and was purchased by Colonel W. P. Price, for the sum of $4,000. The sale was for the purpose of perfecting the title. The line may be shortly extended to the Tate marble works.

Harrisburg & Potomac.—This road was sold last week to the Philadelphia & Reading for $10,000. That company has heretofore controlled the line through ownership of a majority of the stock but operated it independently. The sale was made by the Provident Life and Trust Co., the trustee under the mortgage. The road will form an important part of the new connections being made with the Western Maryland near Harrisburg.

Lehigh Valley.—The subscription books were opened July 7, to the $6,000,000 4½ per cent. first mortgage gold bonds of the New York lines of the company. The amount was largely over-subscribed, both in New York city and Philadelphia, within three hours. The bonds were offered at 101 with interest, payable July 15 next, when negotiable receipts will be issued for the bonds when engraved, on or about Aug. 1. A simultaneous issue was made in New York by Brown Brothers & Co., in London by Brown, Shipley & Co. and in Philadelphia by Drexel & Co.

Louisville & Nashville.—The statement of the company for the year ending June 30 (June, 1890, estimated) shows gross earnings for 1890 of $18,880,513, against $16,599,396 for 1889, an increase of $2,281,117; operating expenses for 1890 of $11,471,120, against $10,326,086 for 1889, an increase of $1,145,034, and net earnings for 1890 of $7,389,393, against $6,273,310 for 1889, an increase of $1,116,083. The total fixed charges for 1890 were $4,930,781, against $5,006,605 for 1889, a decraase of $75,824. The surplus for 1890 is $3,085,793, against $1,943,814 for the previous year.

Louisville Southern.—Under the lease recently made to the East Tennessee, Virginia & Georgia that company guarantees the payment of interest on the five per cent. first mortgage bonds of the company amounting to about $4,000,000. The present net earnings of the company amount, it is stated, to about this sum, so that the lease adds no additional burden to the lessor, but it gives it a very important line to the Ohio River through the Cincinnati Southern, in competing with the Louisville & Nashville for a valuable traffic.

Milwaukee & Northern.—The option on this road, held by the Northern Pacific, expired last week. No sale was made and the option was not renewed. It is reported that negotiations are in progress with the Chicago, Milwaukee & St. Paul for a sale to that company.

Missouri Pacific.—The articles of agreement and consolidation executed between the Interstate Railroad Co. and the St. Louis & Emporia were filed in Kansas July 5. The companies consolidate under the name Interstate Railway Company, and have capital stock of $5,000,000.

New York Central & Hudson River.—The subscriptions received by Drexel, Morgan & Co., of New York, to the new issue of bonds, amounting to $16,000,009, were much greater than the amount offered to the public. As the bonds are payable in 15 years and bear but four per cent. interest there was much interest in financial circles to see whether the issue would be readily subscribed for.

Northern Pacific.—The approximate gross earnings for June, 1890, were $1,839,618, an increase of $42,241 over the earnings for the corresponding period last year. The earnings for 1890 are upon 3,612 miles, an increase of 161 miles over the amount operated in June, 1889.

Old Colony.—The company has taken possession of and is now operating the Martha's Vineyard narrow gauge line in behalf of the trustees.

St. Louis, Arkansas & Texas.—In the United States court at St. Louis Judge Thayer has granted a decree ordering the sale of the road, and appointed Col. D. P. Dyer Special Master in Chancery to conduct the sale. No bids for less than $2,000,000 can be received and the purchasers are required to pay $75,000 within an hour after the sale.

San Antonio & Aransas Pass.—In speaking of the recent default in the payment of interest of the first mortgage bonds President Lott said in effect: we owed $200,000 interest on first mortgage bonds in New York and were unable to meet the demand for the reason that it would so drain our resources as to leave us nothing with which to meet current expenses. Large crops are maturing all along our lines and we can pay the bondholders by Jan. 1, and thus keep out of the hands of a receiver. We have floated $6,000,000 in bonds in New York, and have another lot which would probably sell at 90 per cent. under ordinary conditions, but owing to the present agitation of the railroad commission question in Texas, we have failed to receive an offer for more than 50 cents. We refused to accept that, and consequently could raise no money to meet our interest obligations.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, July 9, 1890.

On July 3, after a long discussion, the Western Freight Association agreed to advance westbound rates. It was found impossible to effect a restoration of the 75-cent basis; a 70-cent basis to Missouri River pointsand 50 cents to St. Paul and Minneapolis was agreed upon. The lines are pledged to maintain existing and determined rates absolutely.

It was voted to withdraw the 30-cent proportional tariff to St. Paul, and that through rates be made on the sum of the Chicago locals. The rate clerks met on Monday and proceeded to line up the rates on the new bases. The following tables show a comparison between the present and the proposed rates:

To Missouri River points...	1	2	3	4	5	A	B	C	D	E
New rate	70	58	42	28	21	28	23	18	16	15
Present rate	60	50	35	25	18	25	20	15	14	13
To St. Paul and Minneapolis	1	2	3	4	5	A	B	C	D	E
New rate	50	40	30	20	15	20	15	12½	11	10
Present rate	40	30	22	17	12½	17	15	12	10	10

Chairman Goddard, of the Western Passenger Association, has authorized the Association lines to meet the excursion rate of $16.70 made by the Burlington from Kansas City to Western Springs. This is the rate which the Alton claimed the right to meet on the ground that it would operate to scalp Chicago business. It is not probable that making this rate will result in another war, as has been predicted by some of the daily papers.

The Trans-Missouri portion of the territory of the new Western Passenger Association will be looked after by the "Trans-Missouri Committee," who will meet in Kansas City on the last Tuesday of each month.

This is meeting week in the associations, but the attendance upon such meetings as have been held has been small and the subjects considered of no special significance. The Western Freight Association passed all their July meetings. The Presidents and members of the Interstate Commerce Railway Association held their regular quarterly meeting on Tuesday, and the Board of Managers of the same association held the 16th regular meeting to-day.

Judge Weaver has issued a writ of injunction, returnable Sept. 9, against the Iowa Board of Railway Commissioners, restraining them from putting in force their schedule of joint rates.

The Presidents voted to temporarily suspend that portion of their agreement requiring action by the Interstate Commerce Railway Association on questions of rates originating in the auxiliary associations. This allows all their members to meet competition of lines outside the association without the delay heretofore necessary to bring matters before the Board of Managers of the Interstate Association.

Traffic Notes.

The June report of the Buffalo Weighing and Inspection Bureau give shippers' weights 2,065,676, corrected weights, 2,436,819; excess over shippers' weights, 371,163

The eastbound business of the Southwestern lines is reported light. The Atchisan leads with 2,627 cars; Burlington next with 1,841 cars. The Chicago, St. Paul & Kansas City has taken comparatively heavy shipments, and reports 1,270 cars.

The rate troubles in Texas appear to have been patched up, and after July 15 rates from Kansas and Missouri points to Texas common points will be restored to the following basis: Corn and oats, 35 cents per 100 lbs.; wheat, rye and barley, 40 cents; flour and meal, 45 cents.

The Hamburg American Steamship line declines to turn its immigrant passengers over to the American Clearing House. The last two steamer loads to arrive were handled entirely by the steamship line, and are said to have been shipped over the Delaware, Lackawanna & Western.

The New York & New England, which had reduced its local coal rates from Newburg to Waterbury and New Britain to $1.20 a ton, has now extended that rate to Springfield and intermediate points, except Hartford and East Hartford, where the rate is 75 cents and 90 cents respectively.

July 7 was a busy day for some of the passenger roads out of Chicago. Large delegations of Knights of Pythias and of school teachers were received and forwarded. The former to attend the biennial gathering of the Supreme Lodge at Milwaukee, the latter to go to the National Educational Convention at St. Paul. In all about 400 carloads were forwarded.

A New Car Service Association.

A number of railroad officers met at Syracuse July 8 and formed a new Car Service Association. Among those present were Theodore Voorhees, New York Central; C. W. Bradley, West Shore; W. W. Currier, Rome, Watertown & Ogdensburg; F. G. Jewett, Mahoning Valley Car Service Association; Adolph H. Schwarz, Delaware, Lackawanna & Western; D. B. McCoy, West Shore, and G. P. Thompson, of Rochester, New York, Lake Erie & Western. An organization was formed called the Central New York Car Service Association. F. G. Jewett, of Youngstown, O., was elected Manager, and the association will cover all competitive points from Lake Ontario to the Pennsylvania state line. The territory will include Rochester on the west and Utica on the east. The railroad companies in the association are the New York Central, the West Shore, the Delaware, Lackawanna & Western, the Rome, Watertown & Ogdensburg, the Syracuse & Baldwinsville, the Syracuse, Ontario & Western, the Elmira, Cortland & Northern, the Northern Central, the Fall Brook Coal Co., the Delaware & Hudson Canal Co., the New York, Lake Erie & Western and the Lehigh Valley.

Monthly Reports of Earnings.

The Interstate Commission has decided to ask the railroad companies for a monthly statement of earnings. The resolution adopted by the Commission requesting these statistics is as follows:

WHEREAS, It is important for the Interstate Commerce Commission to have earlier and more frequent information relative to the business and increased mileage of the railroads of the country than is furnished by the annual reports of the companies to the commissioners;

Resolved, That the several railroad companies within the United States, etc., are requested to transmit to this commission promptly after the 30th of June, 1890, and in advance of the annual report, a brief statement showing the gross earnings, the gross operating expenses, the gross payments from revenue for other purposes, including dividends on bonds and stock for the year ending June 30, 1890, and the number of miles of new construction with the cost thereof during the same period. And be it further

Resolved, That the aforesaid several railroads are requested, subsequent to the 30th of June, 1890, to transmit to this commission monthly, as promptly as possible after the expiration of each and every month, a statement for the preceding month, furnishing the information specified in the foregoing resolution.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, July 5, amounted to 28,513 tons, against 46,398 tons during the preceding week, a decrease of 17,885 tons, and against 39,149 tons during the corresponding week of 1889, a decrease of 10,636 tons. The proportions carried by each road were:

	W'k to July 5.		W'k to June 28.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	4,141	14.7	6,759	14.6
Wabash	2,099	7.6	3,665	7.9
Lake Shore & Michigan South.	4,751	16.9	7,750	16.7
Pitts., Ft. Wayne & Chicago...	3,152	11.3	5,780	12.4
Chicago, St. Louis & Pitts.	4,172	14.8	5,443	11.7
Baltimore & Ohio	1,478	5.3	2,561	5.5
Chicago & Grand Trunk	3,299	11 9	6,540	14.1
New York, Chic. & St. Louis...	1,959	5.2	3,121	6.7
Chicago & Atlantic	3,462	12.3	4,800	10.4
Total	28.513	100.0	46,398	100 0

Of the above shipments 754 tons were flour, 7,747 tons grain, 718 tons millstuffs, 3,765 tons cured meats, 1,234 tons lard, 6,006 tons dressed beef, 1,590 tons butter, 792 tons hides, 396 tons wool and 3,994 tons lumber. The three Vanderbilt lines carried 36.8 per cent., while the two Pennsylvania lines carried but 26.1 per cent.